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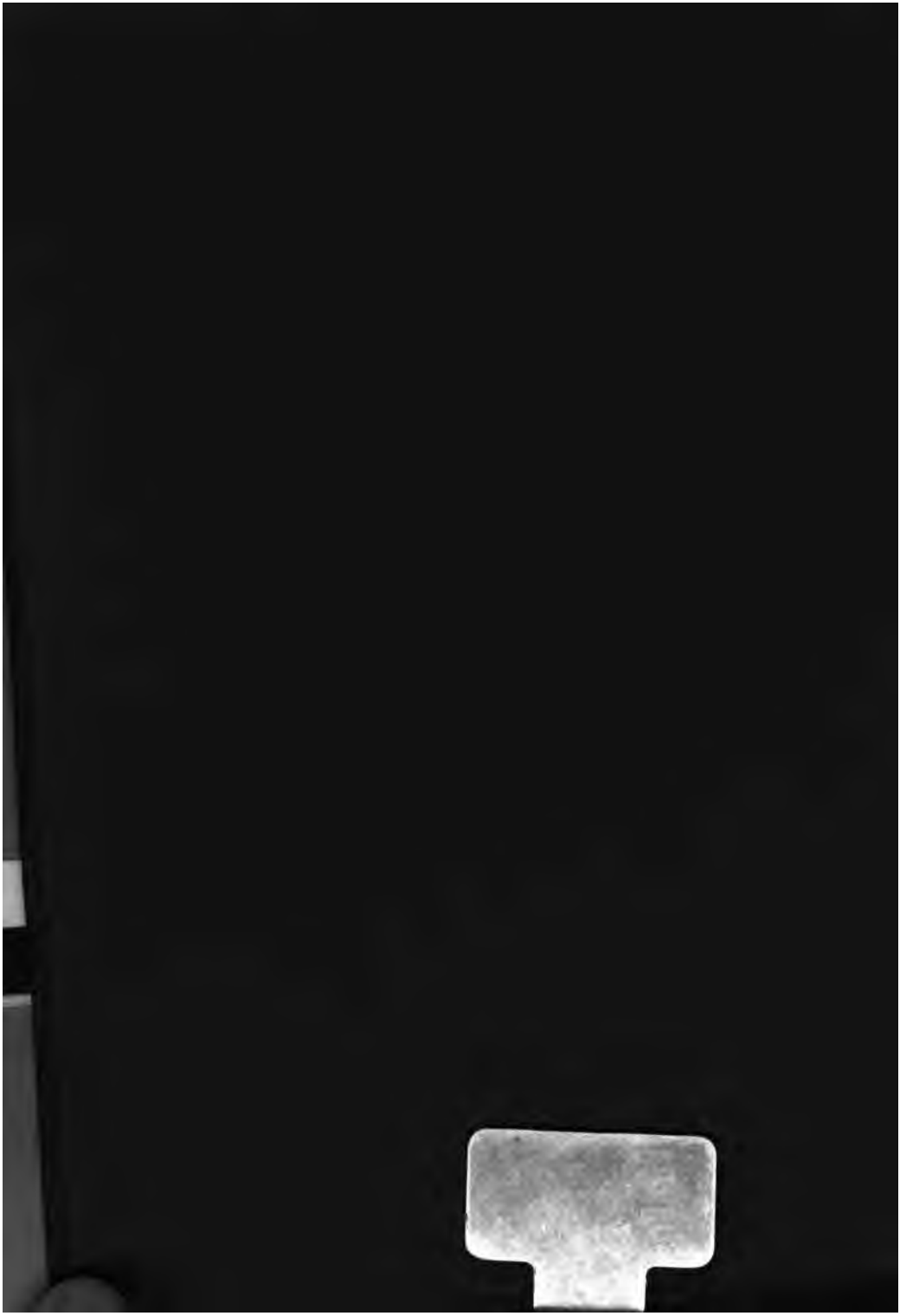
MEDICAL NOTES AND ESSAYS

DIPHTHERIA

DR EADE



MEDICAL
NOTES AND ESSAYS.

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BY

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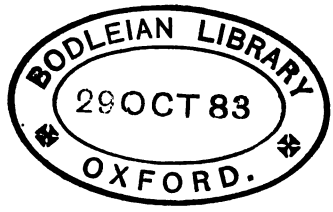
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PREFACE.

Of the many papers, on diverse professional subjects, which I have published during the past years, and which may for the most part be found scattered through the various medical journals, I have thought that some at least might be of sufficient value or interest to justify their re-publication,—with such amplifications and additions as subsequent experience and reading may have suggested and rendered appropriate. None of them can pretend to be treatises on their respective subjects: they can claim nothing but to be the outcome of much thought, and of observations founded upon a large local experience extending over many years. As such, I venture to introduce them in a collected form to the notice of the profession; the first, as will be seen, being on the subject of Diphtheria, with special reference to this disease as witnessed in this district.

As to the extent and consequent value of such experience as is here expressed, it may be urged that the experience of a consulting physician as to any given disease is really of far wider scope than would at first appear, judging from the actual number of cases which he may himself have seen. For his views and conclusions are sure to be deduced not only from a consideration of those cases which he himself has treated, but are certain also in great measure to be derived from the convictions and opinions of the various and most competent medical men with whom he has, in consultation, been thrown

into communication, and whose actual number of cases has in all probability been far greater than his own.

A physician's experience, therefore, may be justly regarded as both concentrated and derived from an extended area.

In two ways may it be hoped that such notes and records may have a value and use: first, as a contemporary illustration of current disease, and of its special local types, if any; and, secondly, they may be supposed to have a future value, as a veritable history of disease at the period at which written.

Whatever, therefore, or however much or little they may contain, differing from that to be found in other writings on the same subjects, they may fairly claim some slight attention on both these grounds.

Fasciculus I.

NOTES ON DIPHTHERIA;

AND PARTICULARLY ON THIS DISEASE AS IT HAS OCCURRED IN NORFOLK.

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INTRODUCTION.

CONTENTING myself with merely alluding to the well-known treatises on Diphtheria, in France by Bretonneau and Trousseau, and in England by Jenner, Greenhow, Mackenzie and others; and also to the able report of the *Lancet* Sanitary Commission in 1859; the following notes will attempt chiefly to express my own personal experience of the disease, and the thoughts which have arisen therefrom in connection with my reading and the views and opinions of others with whom I have consulted. As will be seen, I have endeavoured to illustrate some of the special points touched upon by directly quoting the views of some of my medical friends who have had large experience in this district.

Now although so much has been written on Diphtheria since this disease first became localized in this country, yet no apology can be needed for adding to this literary store, seeing that although the disorder has been most carefully studied from many points of view, and the most searching and extended enquiries have been made into the various epidemics of it which have occurred, yet that our knowledge of it is still most imperfect, both as to its etiology, its mode of propagation, and its cure.

Whilst this is so, all or any facts or opinions must have their value, even if they be only cumulative. And at the least, carefully drawn cases cannot but help to make more assured any ascertained knowledge of the subject.

Within a very few years, a report was read at one of the meetings of our local medical society, in which the author stated that in a recent severe outbreak of this disease, only fourteen patients recovered, out of thirty who were attacked.

And again, quite recently I was informed by a most intelligent and capable surgeon practising in this county, that in one of the earlier epidemics of diphtheria he had numerous cases of the disease occurring simultaneously in his parishes. And so severe was the type, that in one morning at his visitation he found no less than seven patients in one parish dead of this malady.

In spite of all our study, of all our investigations, of all our increased knowledge, are we able to assure ourselves that in case of a fresh epidemic outbreak, even such disastrous results as these might not again occur? Or have we yet learned—in the absence of precise knowledge as to its sources of origin or modes of propagation—how to prevent either the rise or the spread of this modern pestilence?

If this is so, again I say, the subject, so far from being exhausted, is yet almost untouched. And no excuse will ever be necessary for writing upon it until we know not only how to prevent it, but also how to cure it, or at least to guide it to a safe and easy termination.

First Appearance in Norfolk, and Local Writers on Diphtheria.—Probably in no division of England has diphtheria, since its introduction into this country as an epidemic, been more rife than in Norfolk; and consequently nowhere has there been greater opportunity for its study. Certain districts of Norfolk, as well as of Suffolk, were amongst the first to be attacked on its primary outbreak in 1857-8, and a considerable portion of this county has at various times since those years suffered in varying degree from its ravages.

As to the *localities* chiefly affected. On its first appearance, certain low-lying districts near to the broads and rivers of the more northern portions of the county, were the most severely and extensively invaded: and of these the districts around Ludham, Stalham, Smallburgh, North Walsham, and Cromer may be specially mentioned (*vide* Appendix). But soon a large number of other and more inland parishes, as well as Norwich itself, were also attacked. No distinct cause of the epidemic outbreaks could be traced; and it seemed certain that, however contagious the disease might be, it was impossible that so large and simultaneous an outburst in a parish or parishes could be due to propagation from individual to individual.

In succeeding years, many local outbreaks have occurred, and parishes both on low and high levels have suffered. Damp and ill-drained localities have been affected, but so have better circumstanced places. And I have twice myself witnessed a virulent outbreak in a

good house situated on the summit of an elevation, where everything hygienic (except the drains) appeared to be in a most favourable condition.

Prior to this first period, the disease, though well known in France and elsewhere, was, as has often been stated, scarcely regarded as an English malady. It was unknown or unrecognized in our practice, and if it occurred at all, did so only in occasional or isolated instances. So little was it supposed to concern us as practitioners, that I find from my student notes that the then eminent lecturer on the practice of medicine in King's College taught and expressed himself on this subject to the effect that diphtherite (asthenic croup or pseudo-croup) did not occur in this country—the description of it which he gave being taken, he said, from French writers; and that the chief reason for his bringing it before our notice was because it was treated of by some French writers whose works were usually read in this country.

In corroboration of these statements, I find that the word diphtherite or diphtheria does not appear in the indices of the principal English medical journals immediately prior to the second half of the year 1857. But on looking back I find in the *Medical Times and Gazette* for October, 1850, a paper by Dr. J. R. Bennett, read before the Medical Society of London, on some cases of "Diphtherite" which had then recently occurred in his practice. But judging from the commentaries on the cases, and the discussion which followed the reading of the paper, it would seem doubtful if those cases did really represent an outbreak of the true disease as known to us at later periods.

As to the *novelty* of the disease in Norfolk, I may quote the following:*

"Some writers, however, it should be said, are disposed to doubt the novelty of the disease in this country, and profess to have discovered a record of it in some of the older authors; but it is not difficult to show that there are no grounds for such an opinion, and that the description of the appearances in the throat supposed by these writers to refer to that peculiar membrane which I believe to be pathognomic of the disease, is, in fact, a description of the ash-coloured sloughs seen in gangrenous affections of the throat, and can in no way be regarded as a portraiture of the adventitious exudation of true diphtheria. Certain it is that the surgeons of this district, with several of whom I have been in correspondence on the subject, either by letter or in consultation, have unhesitatingly admitted that they had to deal with a disease which to them was perfectly new. Such was my own impression also, for with no inconsiderable familiarity with anginous affections as they are seen connected with the eruptive fevers, and in their idiopathic forms, the aspect of the diphtheritic throat was to me a new experience."

Such also is my own belief and experience up to this time. For although, like others, I had met with malignant and even rapidly fatal sore throat, yet I was certainly not familiar with the diphtheritic membrane in the throat, but only with the foul sloughy ash-coloured appearance, which we were accustomed to associate with cynanche anginosa or maligna.

So also with the cases of "croup" which from time to time occurred in families, and which were at times exceed-

* Ranking on "Diphtheria," 1859, page 6.

ingly fatal to the children,—neither my father's experience, nor that of my own early days of practice, recalls in connection with these any definite faucial exudation, or the true "diphtheric throat"; although the mucous, fibrinous, laryngeal or tracheal exudation of this affection was quite familiar to us. In saying this, I in no way wish here to discuss the question of the identity of croup and diphtheria, which has been elsewhere of late so thoroughly considered. I only desire to illustrate the point of the real or apparent newness of the epidemic throat disease.*

* In reference to this point, it is worth while to compare cases 11 and 8: the one occurring in the year 1850; the other in 1858, *i.e.*, after the commencement of the diphtheric epidemic. The diseased appearances in the air-tubes were almost identical in the two cases, but in the earlier one, as in ordinary cases of "croup," the fauces were unaffected. The question arises, why the disease-cause (if identical) should, prior to 1858, have attacked only the mucous membrane of the large respiratory tubes, but in the later periods should also, and often mainly, have affected the throat and parts above it. Was there some modification of the germ, or of its virulence; or was there a difference in the atmospheric condition, or in the bodily condition of the population?

At the commencement of the epidemic of diphtheria in Norfolk, so striking was this new disease, and so extensively did it prevail, that in the beginning of 1859 both Dr. Ranking and Dr. Copeman (physicians practising in Norwich, and both of whom were, or have since been, attached to the Norfolk and Norwich Hospital) published pamphlets on the subject; and I believe I am correct in saying that these two *brochures* were amongst the first separate publications on diphtheria in England.

In the latter part of this same year (1859) I published in the *Lancet* some cases of the peculiar paralysis of the extremities which occasionally follows as a sequela of this disease, and which, though alluded to by Trousseau, Gull, Kingsford, and others, had scarcely been minutely or definitely described.

In the years which have elapsed since its first appearance, much practical information has been accumulated in this district, and contributed in various ways to the public stock.

Almost the first case noted in this locality was one which occurred in the practice of Mr. Crowfoot, of Beccles, and which was at once recognised by him as an example of the "Diphtherite" which he had formerly been familiar with in Paris.

In 1858-9 a very large amount of experience was acquired by Mr. Dix, senr., Mr. Clowes, and other practitioners in the northern districts of this county; and

subsequent to this the extensive knowledge of the disease gained by Mr. F. Clowes, of Stalham, was communicated by him to the Local Government Board through their then medical inspector; and the substance of which may be found in one of the Reports of the Board.

The transactions of our local medical society (formerly called the Norwich Pathological Society, and now the Norwich Medico-Chirurgical Society) have been enriched by many contributions on this subject; and of these the series of cases by Dr. Barnes, of Eye, Suffolk, in which tracheotomy was performed, may be specially alluded to.

Other papers of much value have also been contributed by various members of the society. Notably:—

An account of a fatal case in an adult, by Dr. Ranking, in 1859.

Also, in the same year, some notes of a fatal case with laryngeal complication, in a child, by Dr. Dove.

So also by Mr. Kidd, of Blofield, who read a paper on the result of his treatment of the disease; and

By Mr. Hughes, of Wymondham, who in 1876 gave an account of a severe and fatal outbreak which had occurred in a neighbouring village.

In 1859, also, Mr. Cadge, in his retrospective address to the society, well summarised the leading features of the disease.

And in the same year I reported a fatal case in a child, with the *post-mortem* examination, and a microscopical account of the appearances seen in the tracheal exudation.

In this year also, Dr. Lowe, of Lynn, in a communication to the *Lancet*, gave an account of his microscopical

examination of some pseudo-membrane ejected from the trachea of a patient who died of this disease.

In 1861 Dr. W. Cooper, of Bury St. Edmunds, read to the Medical Society a valuable report of an epidemic which had recently occurred in his neighbourhood, comprising eighty-one cases of the distinct disease, besides many others of (apparently) simple tonsillitis.

And in 1874, Mr. Prangley of Aylsham, read before the Medical Section of the British Medical Association, then holding its annual meeting in Norwich, a striking and masterly analysis of fifty-six cases of this disease which had occurred in his practice in an epidemic form. An epitome of this paper was subsequently published in the journal of the Association.

My own experience of diphtheria has been very considerable. On its first occurrence in this city, I was attached as Physician to the Norwich Public Dispensary, and in this capacity I had the opportunity, in conjunction with the then resident surgeon, Mr. W. Woodhouse, both of seeing and watching numerous cases of the disease through their whole course, both of the acute illness and of the more chronic stages of the secondary paralysis. And in the subsequent years I have from time to time witnessed many urgent and remarkable examples of its varying phenomena.

Nature of Diphtheria.—Diphtheria is one of those diseases which is, and must at all times be, fraught with much and varied interest, for—

It is an acute disease, which often quickly runs its course; and, if fatal, speedily destroys life.

It often causes great distress to the suffering patient.

It presents in its course an immense variety of symptoms, and calls for unceasing attention in watching and caring for its various urgencies.

It often affects a whole household, and may rapidly spread from one member to another.

It may, and occasionally does, sweep away almost the whole of the affected family.

It spares no class of society, and invades the palace as well as the cottage.

It is liable to be followed by sequelæ, which may themselves endanger life, and which are always tedious and distressing.

Every consideration and every study of the history of this disease points to its being one of the so-called zymotic disorders—*i.e.*, one whose origin is in conditions favourable to the development of microscopic or germ life; whose course implies a definite life history, with definite effects and a definite duration (within certain varying limits); whilst its power of contagion, that is, of reproduction in a fresh patient, points with absolute certainty to the organic nature of its cause, and to the fact that the disease is but

the birth, growth, and death of this germ. The disease reproduces and multiplies itself; therefore, apart from other knowledge on the subject, it may be assumed axiomatically that it has an organic vital nature.

But these considerations, although equivalent to proof, have of late been fortified and made even more absolutely sure by the discovery of the very germs themselves in the diseased "pellicles" and the blood of diphtheric patients; and in consequence of this demonstration, the micrococci of diphtheria may be looked upon as the recognised materies or disease-factors of this malady.

These germs have long been looked for in the throat pellicles, and especially in the laryngeal casts of this disease, and I myself formerly carefully sought with the microscope for such bodies. The cell-organisms of the rapidly exfoliating mucous membranes, and now and then some fungous mycelium were readily discovered in the diseased masses;* but the real germs have not until

* Dr. Lowe, in his letter to the *Lancet* (1859), after alluding to the opinions which had been expressed by Professor Laycock, and Drs. Rogers and Harley, as to the presence or importance of *oidium albicans* or other vegetable fungus in the false membrane of diphtheria, states that in the one example he had then examined there was abundance of the *oidium* in the tracheal exudation. But he adds that he does "not venture to advocate a theory in favour of a diphtheric parasite."

Dr. Lionel Beale, writing in the first volume of his "Archives of Medicine," says of this false membrane, "I do not doubt the assertions of many observers who have found vegetable organism in the false membrane. Doubtless this is a *nidus* favourable to the development of low forms of cryptogamia, and especially in cases where the membrane has been retained for some days within the mouth one would expect to find them. But there are many cases of true diphtheria with an abundant exudation of false membrane, in which not a single specimen of fungus is to be seen; and therefore fungi are not *essential* agents in the disease. On the other hand, these vegetable growths are common enough in cases where there is no tendency to diphtheria."

recently been demonstrated or demonstrable. And it is only with the advance of micro-biology and the recent discovery that such bodies may be differentiated by colour tests, that our knowledge has advanced to its present extent.

For a description of these new-found germs, let me here quote from the *American Journal of Science* for January, 1882. The writer in this journal, speaking of the recent researches and discoveries of Dr. Wood and Dr. Formad, says—

"In examining cases dying from malignant diphtheria, they (Drs. W. and F.) found that the blood in all cases was more or less full of micrococci, some free, others in zooglea masses, others in the white corpuscles. They were also found in the internal organs, especially in the kidneys, where they formed numerous thrombi.*

"Inoculations on animals with material from these cases were always followed by a grayish exudation at the seat of inoculation, and the blood and internal organs always contained these micrococci.

"Studies of the blood in these cases, and of the malignant cases, showed that the micrococci first attack the white corpuscles, in which they move with a vibrating motion.

"In the diphtheric membrane the micrococci frequently exist in balls, which are merely leucocytes full of the plant. The bone marrow also contains these.

"They conclude that the essential poison of malignant diphtheria is found in the micrococci, which must be either the poison itself or the carriers or producers of it.

"From their culture experiments they conclude that the only difference between the micrococci of ordinary sore throat and of malignant diphtheria is in their reproductive activity. They are therefore the same organisms in different states,—the more malignant the more active and continuously reproductive."

* Constituting, as it has been elsewhere termed, a sort of "mechanical mycosis."

It is remarkable that Dr. W. Farr should have many years ago expressed an opinion in reference to this point which is quite in harmony with these views. And Dr. Thorne Thorne has also quite recently called attention to the probable relationship of diphtheria to previous prevalent and seemingly simple sore throat in the locality of the outbreak.* Oertel (see his article in *Ziemssen's Cyclopædia of Medicine*) claims for himself and others to have discovered these micrococci as far back as 1868, both in the false membrane and in the blood and tissues; but I believe that it is only quite recently that the necessary presence of these bodies, or the essential connection of bacteria and diphtheria, has been accepted by the profession as proved.

Such being the intimate nature of diphtheria, the question has arisen, and has been much discussed, as to which is the primary part of the disease—the local affection of the throat or other surface, or the general septicæmia, *i.e.*, the contaminated condition of the blood and tissues which so quickly shows itself. Much has been written on this point, both in England and Germany, and the point is still scarcely decided; but the tendency of belief would now appear to be in the direction of regarding the throat or other mucous membrane as the primary seat of the disease, and the general poisoning of the system as due to rapid absorption or infection from this source.

The example of other known or presumed bacterial diseases gives us but little aid in settling this question;

* *Lancet*, vol. ii., 1878, p. 930.

for some, as scarlet-fever or small-pox, appear to be systemic infections, subsequently showing special local phenomena; whilst others, as typhoid fever and phthisis, appear to be distinctly local diseases at their first onset.

Etiology.—The disease being thus one due essentially to the life and growth of a blood and mucous membrane parasite, its transplantation, or that of its seeds, is of course the immediate cause of its appearance in any fresh case. But facts are yet wanting to show absolutely the general or external cause (atmospheric, paludal, geological, drainage) of either an isolated or epidemic outbreak; or to show how the disease so rapidly spreads in a locality, a parish, or a district.

There has long been an impression that the germ is one which finds its favourite conditions for *active life* or recrudescence in drainage emanations, and impure atmospheric conditions. And although good authorities have expressed strong opinions in opposition to this, yet still this view largely prevails, and it is one which is certainly shared by myself,—that diphtheria and drainage air are closely connected.

Some of my own cases tend strongly to confirm this view. So too, Dr. Richardson writes (*Good Words*, Nov., 1881) of a "house which came into his possession four years ago: the main drain was choked, and it was so unhealthy to children that in a few years there was twice or three times an attack of diphtheritic sore throat, and one child died of it."

Again, it was stated quite recently in the *Lancet*, that "two patients in the same house were ill, one with

diphtheria, the other with scarlatina; and the drainage was of the worst."*

Take another example. Some few years ago, some members of my family took lodgings in a good house at a neighbouring seaport town. On my visiting them two days afterwards, I noticed a peculiar and disagreeable odour about the upper part of the house; and I found that one of them was already suffering from a dirty-looking sore throat. On enquiry and examination I discovered that a pipe which ran direct into the town sewer and opened on the top landing of the house, was not only imperfectly trapped, but that often the bell-trap was for convenience altogether removed, and so the pipe left quite open. I then had this pipe firmly closed with a plug, and soon the house regained its freshness, and the sore throat gradually disappeared.

Some months afterwards, another family went to these same lodgings, and two or three of its members were very shortly after attacked with severe sore throat—of a diphtheroid nature, if not actually true diphtheria. The house drainage arrangements were then examined, and were found to be as described above; and the town sewer, in fact, opened, as before, directly into the house.

Yet again, with reference to the late well-known lamentable outbreak at Darmstadt: although great stress was laid upon the contagiousness or infectiousness of the disease, yet we were told, firstly, that the members of the Darmstadt royal family had previously been continually suffering from various affections of the throat; and,

* In reference to this point, Case 25 is both curious and interesting.

secondly, that the palace drainage had recently been put in order, *i.e.*, that the fouled earth surrounding the drains had been recently disturbed.

The special views offered to the profession by the German physicians in attendance on the occasion of this outbreak are worthy of a passing notice. They may be summed up (I think) in the greatly increased prominence given to the theory of the *active* contagiousness or infectiousness of diphtheria, and the lesser stress laid upon *intermediate* local or zymotic causes of its origin and spread.

In reference to this point, it must be in the experience of most practitioners to have witnessed the continuing occurrence of fresh cases, at intervals of hours or days, or even longer, in a household attacked with diphtheria. And it may fairly be asked, Is the evidence sufficient to justify the belief that in the majority of cases, or even often, the later-attacked patients have derived their disease from those earlier affected, rather than that all have been infected from a common source, and have developed it at different periods, according to their susceptibility, or the dose of the poison imbibed?

It would seem to be unquestionable that diphtheria is often conveyed directly from person to person, yet it is equally certain that in a very large number of instances, a very close communication—even to hugging and kissing—has existed between mothers and children, or nurses and children, without the disease being communicated, or arising, or if so, only to the same extent and apparently in the same way as in other members of the family not so closely associated.

Whilst, therefore, continued contact with a diseased patient, direct conveyance of diphtheritic matter from mouth to mouth, or saturation of the system with diphtheria-poisoned air, may undoubtedly propagate the disease from person to person, yet it so frequently happens that no such results ensue, that a ready conveyance in ordinary cases must be anything but certain or easy.

Practically, if the view of contagion as the chief and usual cause be the true one, and that of the rarer and more difficult conveyance of the poison from person to person be incorrect, we must as a matter of course modify the advice usually given to a suffering family; and we need chiefly to insist upon separation of the healthy from the immediate neighbourhood of the sick, rather than urgently to advise the removal of all from the supposed infected locality.

On the second point. No doubt extensive epidemics, as well as many limited outbreaks, have occurred where no local and limited cause could be discovered. But on the other hand, it sufficiently often happens, where the disease suddenly springs up in a household, that a local septic influence is afterwards found to have been at work, to justify the strong belief that putrefactive material furnishes in many cases the necessary *nidus* for the development of the specific disease germs.

As examples of such apparent origin, I have known the disease of the throat to appear within two or three days of the conscious inhalation of foul air from a stable yard cesspool.

I have known it to attack a row of school-boys in the order in which their beds were placed in their dormitories, beginning with the one nearest to the door through which

the current of air entered—this air being, afterwards shown to have been polluted by the emanations from a most foul cesspool. (Case 9.)

I have seen the disease break out immediately after a family's return to their home, the house during their absence having been closed and unventilated, and a foul drain discharging its air into the interior.

I have seen more than one outbreak of diphtheria in a good house, well placed on an elevation, well drained, and the cesspool far away below in the grounds, yet where this very arrangement has been the most apparent—indeed, almost the unquestionable—source of the evil, from the connecting drains having been unventilated, and their foul air having obtained its only possible vent, viz., into the house through the water-closets at the summit of the drain-pipes. (Case 6.)

A public writer not very long ago said, "There is not a single iota of evidence to connect diphtheria, either in its origin or in its propagation, with badly-constructed drains or defective sewerage." Is this statement, I would ask, borne out by ordinary English experience?

Lastly, in connection with this point, I may mention that in a recent outbreak of the disease in this county, no explanation of its occurrence could be ascertained; yet it was noticeable that just before its appearance some large and deep excavations of the soil of a certain portion of the town had been made in connection with some public works.

On the whole, therefore, in spite of all that has been said and written, I believe that the opinion still largely and justly prevails, that sewer-poisoned air, and fresh *local* outbreaks of diphtheria, have often a very close connection with each other.

It is a practical point, and one worth repeating, that whatever its mode of origin, and although undoubtedly capable of direct communication from person to person, yet that but little danger accrues to the *nurse* under ordinary circumstances in cases of diphtheria, if only reasonable precautions are taken; and especially if care be exercised that diseased mucus be not directly spat or conveyed from the throat of the patient into the mouth, or on to the lips of the attendant.

Diphtheria is *contagious* rather than infectious,—the difference between these two conditions being doubtless that of the varying volatility of the seeds of a malady.

Where these seeds or germs float readily in the air, and can find ready entrance into or attachment to the new body, there we have easily recognised infection. But where this is not the case, and where a more continued application of the germ to the new body is requisite for the due transference of the disease, there we have the less intense form of communicability—by contact only, by contagion.*

Probably a better study of the life history of the diphtherial germ, of its *modus vivendi*, and its volatility in the various stages of its career, will by and by show us why it sometimes has its apparently low form of communicability; and why sometimes it appears to spread readily; and why, again, sometimes in spite of apparently most favourable conditions for this, only one member of a household or in a locality is attacked with the disease.

* There can scarcely be a better illustration of the contrast between volatile and non-volatile germs of disease than that seen in the case of the two fevers, typhoid and typhus. The seeds of the former would appear to have only a very slight amount of volatility, and consequently of infectiousness; whilst of the intense and rapid communicability of the latter I had evidence in my own person, during my student life. I consciously inhaled the putrid breath of a person convalescing from typhus; felt to be affected almost from that moment; and next day was severely ill, subsequently passing through the usual stages of this disease.

Liquids would seem to have unquestionably a power of *conveying* or *carrying* the diphtheric virus; for Mr. Power showed, some four or five years ago (*Lancet*, vol. ii., 1878), that a particular outbreak was undoubtedly caused by diffusion of the infection in a milk supply; and the same mode of propagation has recently been demonstrated or rendered probable by Dr. Airy and Dr. Mackenzie.

The following annotation is extracted from a recent number of the *British Medical Journal*, and it well illustrates not only the diffusibility of the diphtheric poison-germs in water as well as milk, but it tends to corroborate the views expressed above as to the close connection between sewage and the diphtheric disease:—

"Dr. Paine, in his last report on Cardiff, refers to the diffusion of diphtheria in that town by a contaminated milk supply. On enquiring into the causes of a fatal outbreak of diphtheria at a farm-house, Dr. Paine found that milk for town distribution was obtained from this source; and believing that the well water was at fault, he caused it to be examined, and found that it contained an excessive amount of sewage contamination. The use of the well for drinking purposes was prohibited by the sanitary authority, but it was not forbidden for other general use. Some time afterwards, several deaths from diphtheria happened in the town, and it was ascertained that the milk used by the patients had been obtained from this farm. The two vessels used for conveying the milk were rinsed night and morning with water obtained from this well. The well was afterwards permanently closed, and no other fatal cases of diphtheria occurred in the town."

Again, *Can diphtheria be shown to be spread by the mere agency of the wind, i.e.,* can its particular germs be shown to be so conveyed? This would seem to be not very probable theoretically, so far as any considerable distance is con-

cerned; but two cases of the disease are recorded in the *Lancet* for May, 1880, where this is suggested,—the patients having on the day preceding their seizure walked facing a cold east wind, which is supposed to have carried the infectious germs.

Another point. Both cancer and phthisis have been thought by investigators to be more prevalent along the beds of rivers, or where the subsoil is wet and impervious. And in like manner Dr. Airy appears to have thought that there is some connection between *dampness and diphtheria*,—a view corroborated by the special localization of the disease on its first appearance in this county, namely, in the neighbourhood of the rivers and broads, and in the parishes bordering on the coast line; and possibly also by the fact, recalled to my attention by Mr. Williams, that during its first epidemic prevalence in Norwich, this disease appeared to cling in a marked manner to the district of Heigham, much of which is both low-lying and near to the city river.

In reference to this point, I would call attention to a statement made by the late Dr. Cooper, in his paper before alluded to, as to the condition of the parish in which a very extensive and formidable outbreak of diphtheria had occurred. He says, "The epidemic was principally confined to one parish. . . . The village itself is flat; soaking with surface moisture; surrounded by a vast number of trees; and the drainage most deficient, and presenting during the autumn months a large surface of exposed decaying vegetable matter. Closely contiguous is a lake of water stretching over many acres." He adds, that in two days, both of them warm and moist, and with

the wind blowing in a direction from over the lake to the village, no less than seventeen fresh cases occurred.

A gentleman who has for the last thirty years been engaged in a very extensive practice in a district a few miles south-west of London, has recently informed me that during all that period very few cases of diphtheria have come under his notice. His locality presents a marked contrast, as to dryness and the absence of streams, to that of a large portion of this county of Norfolk, with its abundant meadows, and marshes, and water-courses.

As to the *co-occurrence of diphtheria and other zymotic diseases*, such as typhoid fever, or scarlatina; this, though occasionally occurring, is extremely rare. Cases of such coincidence are reported by Murchison and others; Dr. Paget, of Cambridge, has recently reported an instance of it to a branch meeting of the British Medical Association; and Mr. Fawcett has recently been reported to have suffered from both diphtheria and typhoid. With one slight and doubtful exception, I have not seen or heard of their coincidence in Norfolk. When two such diseases do so occur, their simultaneous existence is doubtless only an accident, and due to exposure to two specific causes of disease at the same time—a double illness ensuing. For we have yet to learn that the same germ-cause can produce two diverse specific diseases; that the micrococci of diphtheria and scarlatina, for example, can merge the one into the other. And although this may be possible, and although identical germs in merely different stages of existence may possibly produce different diseases, yet science has scarcely yet demonstrated that this is so.

The Symptoms, as observed in this part of the country, appear to be identical with those common to Diphtheria, as it has appeared in other districts of England as well as abroad. Of these, the most noticeable and distinctive, are—

The sore throat.

The pellicular exudation on the tonsils, fauces, uvula, soft palate, or other parts of the mouth.

The occasional or frequent extension of this membranous exudation upwards into the nares, and downwards into the larynx, trachea, and bronchi.

The occasional appearance of a pellicle on exposed or abraded external surfaces.

The adynamia and apathy which so often attend it.

The deceptive quiescence which may so suddenly end in death.

The frequent albuminuria.

The various paralyses which may attend the earlier periods of convalescence from the acute stage, or may appear several weeks later.

Briefly stated, the disease nearly always begins with these two symptoms—languor or a sense of general illness, and more or less of sore throat. Dr. Ranking said, in 1859, "Often its onset is sudden and marked"; and generally it is so. Thus, in one amongst my noted cases, a lady thought she "caught a cold," felt chilly in

the evening, and the next morning the characteristic condition of the throat was distinctly present. In another case, a young lady had been zealously investigating the mysteries of the grating of an open dead-well in the yard of the house, into which scullery washings and other matters were drained, and by next morning she had been taken ill, and her throat had already begun to exude diphtheroid mucus."

During the course of an attack of diphtheria, the varying amount of soreness of the throat, of swelling of the glands, of dysphagia, and of fever with asthenia, are the most striking symptoms, and are those which are familiar to all practitioners.

The *sore throat* is very variable. It may be very slight, or it may be severe and urgent. It varies greatly, too, as to the amount of pellicular exudation by which it is accompanied.* The varying forms and degrees of this have been so well and so graphically described by Mr. Prangley, of Aylsham, in his paper previously alluded to, that I venture here (and with his permission) to transcribe a portion of his account of them. He says—

"The actual soreness of the throat afforded no indication of the severity of the attack; for although there was generally considerable pain during deglutition, in some cases it was so slight as to be scarcely appreciable. . . . . As a rule, it was more severe with children, and in those cases which were ushered in with acute febrile symptoms, and was generally most experienced during the period of the membrane disappearing; so that I began to look upon the statement that the medicines 'cut the throat' as a good sign; and the absence of all

* Dr. W. Cooper stated that he thought he had observed that the exudation was more likely to extend into the air-tubes when it was of a tough and leathery consistence.

pain nearly always revealed, on inspection, a thick mass of grey slough, and was, consequently, a bad sign. The variety of forms which the false membrane assumes, and the various conditions of the tonsils, are very remarkable. Thus, I have seen the membrane in consistence like glazed starch, cream, wet parchment, and a greyish flesh-like pulp of all degrees of colour, from the purest white to almost black. I have seen it in specks, patches, shreds, and in large firm membranes, forming an exact cast of the part it enveloped. I have seen the specks or patches surrounded by a bright red border, or gradually becoming thinner at the edges, imperceptibly losing itself, so that one could not see how far it extended. I have seen the tonsils engorged to such an extent as to almost meet, or enlarged laterally as if they had been flattened by a weight on their surfaces. And I have notes of one case in which the tonsils were rather depressed. The glands at the angle of the jaws were more or less enlarged, but I never saw them suppurate. . . . . I find that in some the membrane was confined to one tonsil throughout, but these cases were rare. In others, it affected both tonsils. In others the uvula was also affected, and in two cases sloughed off. In several, the membrane covered the palate and pharynx, and in the most severe cases, spread into the nares and trachea."

. . . . . .

"The manner in which the membrane disappeared and the throat recovered, varied considerably. In some cases it broke up into shreds, and was either swallowed or expectorated with mucus. In other cases it exfoliated entire, and in these * * * a new membrane appeared, but of less density than the one which preceded it. Thus, I have seen as many as half-a-dozen successive membranes form one after the other, each one of less density than its predecessor, till at last a thin film of almost transparent lymph was the last trace of exudation. In other cases the membrane retained its original form to the last, and seemed to imperceptibly waste day by day, becoming gradually thinner and more transparent."

The *odour* exhaled by patients suffering from diphtheria is peculiar and special, and from it the disease may often

be diagnosed. The differing and distinctive odour exhaled by the various diseases now generally allowed to be accompanied by, if not caused by, bacterial growths, is very remarkable, and worthy, I think, of more attention than has hitherto been given it. Small-pox, typhoid, typhus, and scarlet-fevers, have all, as is well known, their markedly-distinctive smell. Erysipelas and puerperal fever may often be recognized by their peculiar emanations. The rinderpest in cattle has a most marked and penetrating odour. And I have long taught that many cases of chronic phthisis may be diagnosed by the sense of smell alone.

As all ordinary putrefaction or decomposition of animal tissue is, doubtless, due to, or accompanied by, parasitic growth of multiplying germs, so it would seem that the various odours of zymotic diseases,—varying, yet constant to each species—form a powerful argument (apart from actual demonstration) in favour of the association of all these different disorders, each with a distinct and special bacterial cause.

As is well known, the *false membrane* is a new formation or growth on the mucous membrane, and its removal or shedding leaves, as a rule, no breach of surface, or, at least, no marked or deep ulceration, although occasional exceptions to this are observed. When examined microscopically, it is found to consist of epithelium; mucous particles,—evidently rapidly grown off from the mucous surface; blood cells; occasionally some ordinary vegetable fungous growths; and (as now may be added) the true micrococci of the disease.

As to the peculiar *colour* of the false membrane,

especially in septic cases, the following passage from Oertel is worth quoting in this place:—

"As may be inferred from the colour of the false membranes, numberless capillary hæmorrhages occur . . . . on the surface of the mucous membrane; the blood, in part, infiltrates the false membranes, which, during the rapidly progressing decomposition, soon assume a brownish or blackish colour; and in part, —especially where the hæmorrhages are copious—is poured out between the surface of the mucous membrane and the false membranes, and, to a certain extent, separates them. The mucous membrane itself, when laid bare by the careful removal of the false membranes, is found to be covered with ecchymoses which vary in size from that of a pin's head to that of a lentil, and the number of which stands in exact relation to the intensity of the process. At one time, therefore, we find only a few points of extravasation, while at another the whole surface is strewed with larger and smaller capillary hæmorrhages, lying near, or running into one another. Ecchymoses are also seen on those portions of the mucous membrane of the mouth and fauces which have not been affected with the exudative process."

Similar ecchymoses have been met with in other septic diseases. Thus, they were observed, in 1865, as occurring in the mucous membranes and other parts of animals (oxen and sheep) infected with the disease known as cattle-plague or rinderpest, and they were described by myself and others in the joint report presented at that time to the Norfolk Cattle Plague Association.* After noticing the remarkable darkening of the blood always found in this disease, the report proceeds to say:—

"The reddish-blue or bluish-red tinge always seen in the congested parts is, no doubt, mainly caused by blackened blood shining through the walls of the vessels and the whiter mucous

* See report of the Medical Committee to the Norfolk Cattle Plague Association, pages 12 and 13.

membrane; but it may be also due in part to a partial escape of the colouring matter of the blood."

And again :—

"The congestion of cattle plague would appear to be made up in different localities either of single large vessels distended with blood, or of many large vessels so distended, or of a generally capillary injection, with or without an escape of the colouring matter of the blood, or even of the blood itself, so as to constitute true ecchymosis (the latter shown by microscopical examination). Sometimes a dotted fringe to the arborescent capillaries may be seen, even with the naked eye, giving the appearance of a granular bordering to them in their course, and showing that some of their contents had escaped into the adjacent tissue."

Of *other symptoms*, a varying amount of pain and swelling of the throat glands in common.

Hæmorrhage from the tonsils occurs, though rarely. Bleeding from the nose and gums is occasionally met with. The nostrils are very commonly affected, and cause much difficulty in respiration. A pellicle may appear on the gums, eyelids, or any abraded surface of skin.

The exudation may extend, not only into the respiratory tubes, but into the œsophagus, and even into the stomach.* The patient, especially if a child, may suddenly and unexpectedly die,—of pure asthenia, from heart or nerve failure; or from the formation of fibrinous clots in the pulmonary artery; and this when the disease may have appeared otherwise to be running a favourable course.

The *temperature* in diphtheria does not appear to be at all distinctive. Usually at first it is raised, often considerably so, and this condition commonly exists during the febrile stage. But in many cases, and especially where septicæmia is marked, and where much asthenia is present,

* See Dr. Cooper's paper in Transactions of Norwich Pathological Society.

there is a constant tendency in the vital heat to become lowered, and, consequently, in the thermometric register to become sub-normal.

The albuminous condition of the urine (specially noticed by Dr. Wade, of Birmingham) is another symptom which calls for remark. It has here, as elsewhere, been found to be present in a large number of cases, and, doubtless, is due to the peculiar infarction of the vessels of the kidneys, described by Dr. Wood as being discovered in these organs in fatal cases.

It would seem probable that the same condition of kidneys is also present in other acute zymotic diseases (such, especially, as scarlatina and erysipelas), in which albuminuria is a constant symptom. In these, such a capillary obstruction is, therefore, doubtless, the cause of that shedding of the renal epithelial lining which has usually been looked upon as simply inflammatory—the so-called desquamative nephritis; but which is more probably merely a necrotic and destructive shedding of the epithelial scales.

In connection with the general course of an attack of diphtheria, I may here again allude to the opinion formerly expressed by Dr. Farr as to the probability of some relationship between diphtheria and preceding mild epidemic sore throat. And it is not uninteresting to note—in reference to its various stages—the course usually run by an ordinary "influenza," or common winter cold. This, as is well known, frequently commences almost suddenly. It often begins with some stiffness or soreness of the throat, though the fauces, on being examined, show only a long and relaxed uvula, with, perhaps, some large and

distended veins. In the course of one, two, or three days this condition will yield, and then will come evidence of the extension of the affection to the nose—the patient will have got "a head cold," with sneezing and coryza. Again, after one or several days, these symptoms will decline, but before the attack finally passes away, before "the cold" is done with, some bronchial irritation will come on, shown by wheezing and slight cough and expectoration. And then, after a further short period, these symptoms, also, will pass away, and the attack will be over.

How like in miniature is this series of stages to those of a spreading diphtheria, beginning, as it does, in the throat and extending upwards into the nostrils, and downwards into the air-tubes. Still, the two disorders show, otherwise, very wide divergencies, and there is reason to believe that the cause in the case of a "cold" is often not atmospheric and vital, but a reflex nervous impression from the surface.

Of the various *paralyses* which may follow the subsidence of the acute disease, and to which, in varying degree, a large portion of the patient's body is liable, we have had very varied experience,—from the commoner diminution of the functional power of the throat, palate, or eyes, which is among the earlier and slighter of the paralytic sequelæ; or the more formidable paralysis of parts of the larynx or œsophagus, or the almost complete general paralysis which are sometimes met with later on; to the well-known partial paralysis of the limbs, which is one of the latest and most interesting of these peculiar phenomena.

Paralysis of the muscles of the soft palate and of the pharynx is decidedly the most common. It is also, usually, the paresis first noticed. Paralysis of the muscles of the eye, causing disturbance of vision, is also one of the early secondary affections. In the former, difficulties of speech, of swallowing, and of coughing or expectorating are the phenomena observed. In the latter, weakness of sight, double vision, or squinting may be present. Dilatation of the pupils has frequently also been a marked symptom.

When the larynx is affected, which, when occurring, is usually somewhat later on, the voice is altered, and the patient either becomes hoarse or weak-voiced, or altogether aphonic.

In paralysis of the trunk or limbs, there is, of course,

more or less loss of power in the various muscles affected. Sensation is much less interfered with than the muscular power, and its alteration is chiefly seen in some anæsthesia or slight numbness of the limbs or other parts.

Although nearly the whole body *may* be affected, in almost all cases the paralysis is partial and incomplete. In that of the limbs, it consists of a numbness or tingling in the feet and hands, with more or less diminution of the muscular power of standing, walking, or grasping. There is also a great deficiency of reflex action, as shown by tickling the soles of the feet; or by testing the patellar tendon reflex, as pointed out by Dr. Buzzard. Usually, the loss of power is bilateral, but rarely it is almost unilateral.

In the commoner cases, the loss of common sensation extends only to the middle of the forearms and of the calves of the legs. In other cases it reaches to just above the knees and elbows. But in rare cases (as in one mentioned to me by Dr. Miller, of Eye) it may extend up the thighs on to the lower part of the abdomen, involving the cutaneous nerves of the penis and scrotum. It has been said to involve almost the whole body.

In one of my cases, numbness was experienced also in the face and cheeks and nose; and in one there was, in addition, some *pain* at the back of the neck.

The paralysis of the extremities only, which, as has been said, is usually one of the latest to show itself, is often attended with very curious and interesting features. It rarely commences in less than a month after the first seizure. And it may not begin until five to ten weeks have elapsed (from five to six weeks being, apparently, the

favourite date). Patients suffering from it will often present a very peculiar appearance. Except that they may be a little languid and weak, they may present no signs of illness, and they have sometimes at first given the impression that their complaints were imaginary.

In one or two cases, the patient suffering from partial paralysis of the extremities has been observed to pass a very large quantity of uric acid with the urine, and crystals of oxalate of lime have also been found to be simultaneously present.

The exact cause of these paralyses does not seem even now to be quite decided. It has been supposed to be reflex: and, also, to be due to a chemical action upon the nerve tissues of a diphtheric poison—an opinion expressed by many others, as well as myself (*Lancet*, vol. ii., 1859), and endorsed by Dr. Brown-Séquard;—but which must now probably be superseded by considering it as due to some influence exerted by bacterial germs upon the nutritive arteries of the nerve centres, or nerve roots, in the spinal cord.

As a rule, post diphtherial paralyses all tend to recovery, although this happy termination is often slow to arrive. The faucial and ocular paralyses are usually amongst the first to yield, and are the least important. The most dangerous paralysis has seemed to be that which seizes upon the chest segment of the body, and especially that which involves the œsophagus, which latter implication may cause, not only difficulty, but absolute impossibility of swallowing. And I have witnessed few more painful sights than that of the distress which has been produced by attempts, under such circumstances, to pass food into the

stomach. In spite of the feeding tube, and of rectal feeding, this form of paralysis has, in my experience, been a very severe or fatal one (for example, see case 16).

The only cases of death from post diphtherial paralysis which I have seen have been of this latter class, but Oertel says it may also be caused "by sudden suffocation, the result of the entrance of large pieces of food into the air-passages; by pneumonia, caused by foreign bodies in the lungs; by inanition; by extension of the paralysis to the muscles of respiration; by intercurrent disease of the lungs and pleura; and, finally, by paralysis of the heart."

As to cases of *peripheral* paralysis, although these are often exceedingly tedious, lasting for weeks or even months, yet eventually they almost invariably recover. And it is noticeable how often, when the extremities are affected, other parts of the body remain free from injury.

Diphtheria in Animals.—The following history has been communicated to me. In the year 1873 a household in Suffolk was attacked with diphtheria. In January of this year a little girl aged five was seized with this disease, and died. The family then removed from their home, and remained away for several weeks. Very shortly after their return, another daughter was taken ill, then two other children and the mother—the latter and one of the children dying.

Belonging to the elder girl, was a pet pony which she had used just before and up to the time of her own seizure. This pony then became ill, was dull and strengthless for three or four days, and then died. After necroscopical examination, the veterinary surgeon in attendance declared that there was disease of the nostrils, and backwards from these to the throat, and that its character was such that, "if it were possible," he should say decidedly that the pony had died of diphtheria.*

The inoculation experiments on rabbits and other animals, quoted by Oertel, are well known. They appear to have been partially successful. Dr. Mackenzie quotes Dr. Bossi's case of a greyhound which died with diphtheric symptoms, after swallowing the excrement of a child suffering from true diphtheria.

* As so often happens in such outbreaks, the premises were examined, and unknown and quite unexpected dead wells were found, which had not been cleansed for a very long time, and which were quite unventilated; the kitchen sink drain, which opened to them, being also found quite insecure.

The Treatment of diphtheria is well divided into three heads:—1. Local; 2. General; 3. That of the secondary paralyses.

1. Local. The disease being one of a general character, although mainly showing its special characteristics in the throat, has yet its own peculiar dangers from the situation of the fauces, and the neighbourhood to these of important and vital parts to which the exudation upon them may spread. And, not only so, but, in consequence of this throat implication, there is often much local distress to be relieved, fœtor to be corrected, difficulty of swallowing to be combated, and secondary glandular swelling to be attended to. There is no doubt, also, that in a large number of instances the severity of the throat affection bears a close relation to that of the whole illness. It is, therefore, not surprising that, from the first, efforts have always been made to combat the disease in this its chief local manifestation.

With a view to this result, and to the relief of the throat distress, the most varied applications have been made to the false membrane and to the surface to which it is attached. At first the general custom in this district was to follow the advice of Bretonneau, Trousseau, and others, and to apply to the throat some strong caustic, such as hydrochloric acid, or the nitrate of silver—either solid, or in strong solution. But our experience, like that of others,

soon showed that, although the application of the caustics did, unquestionably, cause the shedding of the exudation and of the *quasi*-membrane, yet that it did not prevent its rapid re-formation, whilst the application itself was often unduly painful and severe, and the course of the disease did not appear to be shortened by it. And especially was this the case where, as in some instances was done, the strong acid or the silver was repeatedly applied to the throat at intervals of only two, three, or four hours.*

And gradually it became clear that this teaching of Bretonneau was not borne out by practice, and so strong caustics became gradually relinquished in favour of milder applications.

Passing to the other extreme, some practitioners have thought that all local interference was best avoided, and that all that could be done with advantage was to apply poultices or water compresses to the throat externally, and to get the patient constantly or frequently to suck morsels of ice, or to gargle the throat from time to time with a little warm milk. But it is certain that some comfort is derived from the use of some of the milder applications which cause the shedding or the shrinking of the false membrane, whilst the fœtor is also somewhat diminished, and there is further, at least the hope that they may help to prevent the spreading of the false membrane to the more vital parts.

The plan of *sucking ice* freely has proved often to be

* Dr. Ranking, in his lecture, spoke cautiously of the advantage of the application of nitrate of silver to the fauces; and Dr. Copeman alluded hopefully to the use of hydrochloric acid. Both of these agents were, at one time, fully employed by myself also.

very grateful and comforting, but still it is not always useful, or even agreeable, and it is, of course, only available in the case of adult patients, who can and will suck or swallow it.

As milder topical applications, the tincture of the *perchloride of iron* has been frequently employed. And, in my own practice, Beaufoy's *solution of chloride of soda* has often appeared to give comfort and a sense of coolness. To the pleasantness and apparent utility of this latter there is also much concurrent testimony.*

In later years, the glycerine of *carbolic acid*, a solution of *borax* and of *boracic acid*, and the tincture of *iodine*, have been variously employed.

Amongst others, Mr. Hugh Taylor, of Coltishall, has long advocated the free use of this latter agent in diphtheria, both locally and generally. And he tells me that after an experience of a very large number of cases, he prefers this plan of treatment to any other. He paints the tincture (of the London Pharmacopæia) freely on to the throat, and he orders it also to be inhaled from the steam of warm water as often as the patient can do it. He also administers internally three or four drops of the tincture at short intervals.

Mr. Prangley, besides speaking highly of its practical efficacy in his paper, before referred to, writes to me quite recently, "I have seen a good many cases (of diph-

* Mr. Williams, of this city, has kindly given me notes of a series of cases of diphtheria which have fallen under his own observation, in which he applied the solution of chloride of soda freely to the throat, with apparently very marked benefit and assistance towards cure. Other local medical practitioners have also expressed a high opinion of its value.

theria) since it was written, and, notwithstanding all the various new remedies that have been recommended in the various journals, I have still as much confidence as ever in the iodine treatment."

He thus describes his method of employing it, which is, practically, the same as that adopted by other practitioners :—

"The local treatment . . . . was the application of tincture of iodine (forty-eight grains to one ounce) to every part of the throat covered with membrane, at least once in twenty-four hours, and the inhalation of iodine vapour mixed with steam, but more especially the latter, if the larynx were invaded. If the membrane were firm in texture, and not too strongly adherent, I always removed it and applied the tincture of iodine to the denuded surface, and with the best results. For, although frequently the membrane would re-form, yet it never regained its pristine condition. If the membrane were in specks or shreds, I applied the iodine over them, and in general half-a-dozen applications were all that were required to procure their dismissal, and, in several instances, two applications were sufficient."

The above is very strong testimony to the efficacy of the iodine treatment, and I think there is no question of its frequently beneficial action.

Other topical remedies, in great variety, have been recommended, either applied with a brush, or inhaled as vapour, or applied in the form of spray. The two latter methods appear to have insufficient penetrative power on the false membrane, and to be chiefly useful where the air passages are invaded.

Of other remedies, the *benzoate of soda* has been highly recommended, but I have no experience in its employment.

The late Mr. G. Hutchison, of this city, strongly insisted that he had seen marked benefit in some bad cases

from bringing out an eruption with *croton oil* on the outside of the throat, but I believe this practice has not been followed by others, and it appears to be liable to the disadvantage of being followed by the development of a false membrane upon the ruptured or excoriated skin.

2. With regard to general treatment, we are bound to confess that in this, as in all other zymotic diseases, we have no remedy upon which we can depend to destroy the disease cause, and so to cut short the progress of the malady. And the reason is obvious, for, as the germ is apparently as tenacious of life, or even more so, than the human body in which it is living and multiplying, it follows that any remedy potent enough to destroy its vitality, would also destroy the life of the blood or of the tissues of the patient.* The utmost we can do, appears to be to make the blood of the patient chemically somewhat less agreeable or nutritive to the parasite; or, possibly, in a certain small degree to prevent the tendency to putrefaction of the tissues, which latter action seems to be coincident and synonymous with that of life and the multiplication of the germs.

Of medicines, those alone have seemed to be distinctly of service which are either of the class called antiseptic, or which have markedly those properties which are termed "tonic."

Perhaps the most generally used drug has been the tincture of perchloride of iron, with or without quinine added. In my own practice, and especially in the case of

* "And we yet know of no drug which can single out the bacterial germs (as the aniline dyes do in colouring them), and destructively seize upon them, and yet leave the human blood and tissues unharmed."

adults, I have, usually either prescribed this medicine or (what, perhaps, I have, on the whole, preferred) a mixture consisting of chlorate of potash, dilute hydrochloric acid, and of cinchona bark.

Mr. W. F. Dix, after large experience, speaks highly of the value of the liquor chlori of the Pharmacopœia.

In all cases, both of children and adults, the free supply of nutriment, as far as it can be swallowed or taken, has always been advised. Free support was strongly urged by Trousseau and other French writers. Dr. Ranking repeated this advice in 1859, and its imperative necessity has been urged by all subsequent writers, and has been acted upon by nearly all practitioners since this time.

Along with nutritive liquids (milk, broth, eggs, jelly, &c.) wine has often been given, and though children often refuse to swallow it on account of the smarting of the throat which it produces, yet its desirableness and beneficial effects are undoubted.

In very severe cases, and especially in adults, brandy freely is occasionally required; and now and then a bad and failing case may be saved by its unsparing administration.*

When the power of swallowing is nearly lost, brandy

* To show how largely brandy may occasionally be given with advantage, and to the saving of life, I may here mention a case of typhoid fever, of a low and apparently hopeless type, which I treated many years ago, in which the patient appeared to be dying from hour to hour, but who was apparently sustained by half-hourly doses of alcohol, and who eventually made a good recovery. In this case, some thirty ounces of brandy and many ounces of port wine were given daily for several days—and in no sense was there any alcoholism produced, nor the slightest appearance of any effect except what was beneficial.

may be properly given by the rectum, and in the same way beef tea, &c., may often be thus suitably administered.

Of the many other internal remedies which have been tried and recommended, perhaps the *iodide of potassium* and the *compound solution of iodine* have appeared to offer the most advantages. And, indeed, the marked benefit often derived from their use in the treatment of scarlatinal dropsy with albuminuria would bespeak attention to their probable advantage in diphtheria.

The plan of treating this disease by giving *calomel* freely, as formerly recommended by Bretonneau and others, has not, I believe, been much followed. It is discussed by Dr. Copeman in his pamphlet. The late Mr. Hutchison tried it, and he stated to me that he had seen excellent results in some cases from its employment. But, practically, its use appears now to be all but abandoned.

But though theoretically, and looking to the asthenic nature of diphtheria, it would seem that the administration of calomel must be utterly unsuitable, so long as our idea of the disease was that it was due to a chemical blood poison, yet now that we know that this—like all reproductive diseases—is due to the presence of a living germ, and that this germ is of the bacterial class, this theoretical objection falls to the ground. For it is quite fair to argue that if mercury can antagonize and destroy the living essence or growths of syphilitic disease, there can be no reason, *a priori*, why it might not also oppose and neutralize the germs or micrococci of diphtheria.

Pilocarpine, swallowed or sub-cutaneously injected, has recently been much extolled, especially by Dr. Guttmann,

of Cronstadt, who said that it cured nearly all his cases, even those which appeared to be almost hopeless.

Its beneficial influence was supposed to be exerted through its power of augmenting the buccal secretions, and so of aiding the separation and detachment of the false membranes.

It has been fairly tried, but later experimenters have not confirmed the favourable opinions expressed concerning it; they, on the other hand, have shown it to be often dangerous, especially to children. It has, therefore, fallen into disuse. But, indeed, the theory upon which it has been advised appears to be both radically unsound and insufficient.

In some cases, I (and those with whom I have been associated) have at once *removed the* diseased as well as healthy *children, from the infected house.* This ensures freedom from further local atmospheric taint, if such there be, and is, doubtless, in many instances, desirable; but I have been disappointed in not finding so much advantage, or such quickly manifest improvement in the condition of the patients as I had hoped for.

Our expectation from the proceeding will, necessarily, be much or little, according as we regard the disease as contracted by contagion only, from persons, or as due to the intermediation of local atmospheric contaminations. Clearly, the removal should be advised where there is distinct ground for suspecting local prejudicial influences.

3. In the treatment of the various paralyses which follow an attack of diphtheria, various medicinal remedies have been tried, such, especially, as the salts of iron, zinc, arsenic, and strychnine.

Of these, the salts of zinc have, perhaps, appeared to me to exercise the most decidedly beneficial influence, though, usually, two or more have been prescribed in combination. But these affections are, as a rule, tedious in their course, and often appear, only, at length, to be removed by change of air—especially to the seaside, and by the patient use of various hygienic appliances. The application of faradaic electricity to the weakened parts, and particularly when the limbs have been the parts affected, would seem to be occasionally helpful.

Tracheotomy.—The question of tracheotomy in laryngeal and tracheal diphtheria is one which has received a large amount of consideration. And deservedly so, for upon its performance or not often hangs the final chance of saving a waning life. It is often useless, partly because of the general asthenia and poisoned condition of the system, partly because it has been undertaken when the patient was in a moribund condition, and partly, because of the extension of the exudation into the air-tubes below the point opened, so that the due admission of the necessary air to the lungs has been still prevented. The operation also appears to be rarely successful when performed on children under two years of age. But, on the other hand, general experience (since Trousseau so strongly recommended it) shows that life is sufficiently often saved by it, to render the operation (in suitable cases) not only desirable, but one we are bound to propose.

On this point, Bouchut says*—

"When all the preceding means have failed, and the disease, becoming every day more serious, has produced that state approaching asphyxia in which a fit of suffocation may involve the death of the child, there is no more time for hesitation, and we must open artificially a new passage for the external air; we must, in fact, practise tracheotomy."

And Trousseau says—

"The successful results which are proclaimed on all sides, speak so loudly in favour of operating, as to bear down all oppo-

* New Sydenham Society's edition.

sition; and I do not stand alone in preaching that there is an imperative duty imposed on the practitioner of performing tracheotomy; a duty as obligatory as tying the carotid artery, when that vessel has been wounded, although death, quite as often as recovery, follows the operation."

He adds*—

"I have now performed the operation in more than two hundred cases of diphtheria, and I have the satisfaction of knowing that one-fourth of these operations were successful. . . . . My impression is that one-half of the cases operated on in private practice ought to prove successful, provided, of course, the operation is performed, under conditions in which recovery is possible."

In considering this question, experience shows that it is necessary carefully to distinguish between the asthenia and semi-coma which (especially in children) may come on from mere blood-poisoning and nervous exhaustion, without severe respiratory implication, and the somewhat similar condition which is induced by a continuance of exudative impediment in the larynx and trachea. In the former case any operation is scarcely required, and is almost certainly useless, whilst in the latter case its performance may be imperatively called for. The distinction may at times be difficult, but is readily drawn by those who have had the opportunity of watching the progress of the case, and of observing the gradual invasion (or otherwise) of the respiratory difficulty.

The operation of tracheotomy has been had recourse to fairly often in this district, and a considerable number of cases that have been operated on have been reported to our medical society and otherwise.

* Trousseau's Clinical Lectures, edited by New Sydenham Society.

Dr. Barnes has related a series of five cases, in which he performed tracheotomy for diphtheria, with the result of saving two out of the five.

Mr. Cadge is well known to have performed the operation several times.

And the late Mr. Firth, Mr. Williams, Mr. Allen, and Mr. Morse, have all reported or had recorded cases of tracheotomy for this disease.

The two cases (cases 9 and 10) in which I was associated with Mr. Cadge and Mr. Crosse, have been related at length, as they serve to illustrate many of the points and difficulties which arise in such emergencies.

In any given case of laryngo-tracheal implication, certain questions urgently present themselves. For example, the *time* at which tracheotomy should be performed, if at all, is one which always requires the most careful consideration, and a nice judgment. For, on the one hand, it is far too serious to be recommended without the most positive necessity; and, on the other hand, if too long delayed, until the nerve force is waning, and the countenance is dusky, and the bronchial tubes are filled with exudation, it is then commonly useless, and the case is hopeless.

It seems to me that, besides the danger of its uselessness from the causes usually mentioned, namely, the general adynamia, the septicæmia, and the carbonization of the blood, there is also great danger of a special local exhaustion of nerve power, of the nerve power of the tissues and muscles of the neck and windpipe and bronchial tubes.

Anyone who has watched a child suffering from croupous obstruction of the larynx and trachea will have

observed the prolonged and laborious efforts which are necessary to the continued act of respiration, and will often have noticed how gradually but certainly the signs of local exhaustion from this sustained effort will creep on and develop themselves—an exhaustion which results in the same fatal relaxation of tissue as is seen in the tympanites of exhausted and distended intestines in fever, or in the dilated air cells and large crepitation of the last stage of asthenic pneumonia.

The result of such local exhaustion is unquestionably that a child operated on in this stage has a further and secondary morbid condition to contend with, and one which, in so enfeebling a disease generally, may play no small part in preventing a successful recovery or recuperation after the operation.

Another question is, should *chloroform* or *ether* be given for the performance of the operation? My own small experience would tend to show that these anæsthetics should be used, if at all, with the utmost caution. For chloroform at this stage is powerfully depressing to the heart's action, and ether tends to excite the respiratory motions, and, further, by the efforts it excites, interferes with the operator. I have, myself, seen a feeble and exhausted child die upon the table as soon as chloroform, which was being most cautiously administered, began to produce a slight sensible effect (case 10). And, moreover, it must be remembered that it may, probably, be found that the sensibility of the skin is so much lessened, and a condition so nearly akin to anæsthesia is present, that scarcely any struggling or resistance on the part of the child will be experienced (case 9). The truth would seem

to be, that if the operation is performed at a comparatively early period, a small but carefully-watched quantity of chloroform must be employed; but that in the latter and more asthenic stages, the danger of the anæsthetics are so markedly increased, that it is better to do without them, and to trust to sufficient restraint of the feeble child, and to a quick performance of the operation.

The operation being once properly accomplished, and a freer ingress of air allowed, almost immediate relief follows. In favourable cases this relief continues, but, unfortunately, it too often merely excites false hopes, for, after a short time, the respiratory act plainly again begins to fail, and, the asthenia rapidly increasing, the child dies. This event is almost certain to result, unless due attention is paid to the management of the tracheal tube, the maintenance of a constantly pervious canal by frequent cleansing and the use of a double canula, by careful attention to the quality of air (as to warmth, moisture, &c.) which the child is allowed to inhale, and, possibly, by the impregnation of the atmosphere of the chamber with some antiseptic vapour.

With these aids, and the most diligent care, in spite of all dangers and difficulties, a sufficient proportion of recoveries is noted, not only to justify but to make imperative, in bad cases, a resort to tracheotomy.

ILLUSTRATIVE CASES.

Case 1.—DIPHTHERIA. Slight attack. Recovery.

Mrs. K., æt. 60. Stout and healthy. Complained on June 16th, 1859, of feeling unwell, and as if she had caught cold. This was followed by great languor and feebleness, and disinclination to any effort. The tongue became dry, and soon there was soreness of the throat, and pain and difficulty in swallowing. On the following morning the whole pharynx was seen to be slightly swollen, congested, and red—the redness being of a dark, almost claret, colour, and most marked on the left side of the pharynx, on the left tonsil, and left half of the palate. The tonsil was also considerably swollen, and on its surface were six or eight small, white, squarish patches of membranous matter. The pulse was small and weak, not quick. The skin was relaxed.

The whole throat was now mopped out with hydrochloric acid diluted with twice its bulk of water, and she was ordered some port wine, and to take half a drachm of the tincture of sesquichloride of iron at intervals. She was at once somewhat relieved by these measures; and by the next morning the throat was free from membrane, and the redness of a much brighter colour. The left tonsil, however, looked as if superficially excoriated.

From this time she steadily improved. The feelings of depression gradually passed off. The throat improved in

appearance, and in a few days she was nearly well. She continued to take the tincture of iron for several days.

Case 2.—DIPHTHERIA. Slight attack. Recovery.

Mr. S., æt. 19. When seen on October 10th, 1867, had been ill three days. His illness was believed to be due to exposure to the contagion of diphtheria, which was prevalent in the village in which he lived. Twenty-four hours after this exposure he had had a shivering fit, and then the throat had become sore. When seen by me, both tonsils were large and swollen, red, and superficially excoriated; the right being more affected than the left. The uvula was long, red, œdematous, and caused a frequent, teazing cough. There was no distinct diphtheritic membrane on any part of the throat, only some small points of exudation. Pulse 90. The skin hot. The expression of countenance good. He was ordered a mixture of chlorate of potash, dilute hydrochloric acid, and quinine, and some counter-irritation with mustard to the outside of the throat.

He recovered in a few days.

Case 3.—DIPHTHERIA. Recovery.

A. F., æt. 4. Seen on June 30th, 1859. His mother stated that the child had been ill four days, with symptoms of a bad cold, and with a discharge from the nose, a hot skin, wheezing in his breathing, and, occasionally, a choking in his throat. He had also bled from the nose several times in the preceding few days. Although weaker, she thought his throat appeared to be better than at first.

The mother added that she, herself, was just convalescing from a sore throat, and that a fortnight before she had buried a child, who had died with the same kind of sore throat.

On examination, the boy was found to breathe pretty freely, and without noise. The nose was very much obstructed. He was very restless; the muscles relaxed, the skin dry and hot, the pulse soft and quick. The throat was not red, and was quite free from exudation.

Two days later, however, the whole throat became red and swollen, and covered with spots or small patches of false membrane.

He was ordered ℥. xv. of tr. ferri sesquichloridi, to be taken three times a day, in water; the throat was several times cauterized with dilute hydrochloric acid; and the bowels were cleared out with a powder of calomel and rhubarb. He soon began to improve, and in about a month appeared to be perfectly recovered.

Case 4.—DIPHTHERIA. Foul drains in the house. Recovery.

Mrs. C., æt. 52. Seen on February 10th, 1871. This lady had been suffering from sore throat for two weeks, and three other members of the household had also been ill with sore throat, of a diphtheritic character.

She was not, however, very severely ill, but was weak and languid, with a quick, weak pulse, and a perspiring skin. The throat was generally pink in colour, and the tonsils swollen. She had thought herself to be recovering, some three days previously; but, after taking an open-air drive, had become more ill again.

The house was known to have a foul drain, in connexion with a long-unemptied and unventilated cesspool.

She soon recovered.

Case 5.—DIPHTHERIA, of low type. Death.

A. B. C., æt. 3. On February 11th, 1869, had been ill five days, suffering from sore throat. On this day, she was found to have red swollen tonsils, covered with a white layer of exudation. Her lips were dry and dark, but her tongue moist. Her eyes were very bright. Her manner was apathetic; but when roused, she was fairly intelligent. She was often restless; and actively and violently resisted taking nourishment. The larynx appeared to be unaffected.

Two other children were then lying dead in the house, of diphtheria.

She was ordered to have plenty of fresh air, and to have a beef-tea enema administered at intervals.

She died two days later.

The cause of this outbreak was not manifest. No foul drains existed on the premises. The house stood on the edge of a level of marshes.

Case 6.—DIPHTHERIA. Expectoration of membranous coat of windpipe. Slight paralysis. Recovery.

Mrs. M., æt. 35. Seen January 16th, 1869, with Mr. Muriel, when she had been ailing for two days. A son had died of diphtheria, four days previously. She was then weak, hoarse, and chilly. The throat was red; the skin moist; the pulse 80, and feeble. She had, a few

hours previously, spat up a membranous cast, about two and a half inches long, evidently a mould of some portion of the windpipe. She was, at once, ordered to use frequently an inhalation of steam, medicated with tincture of conium; to take a glass of port wine every three hours, with fluid food frequently; and also to take a draught, containing liquor cinchonæ, chlorate of potash, and hydrochloric acid, at intervals.

This case progressed very slowly. There was very little suffering from the throat, but she was always hoarse; and, when speaking, produced a sound, partly one of ordinary aphonia, and partly as if there were loose mucus in the larynx, preventing the formation of the voice. The constitutional symptoms were not severe. The pulse was never much quickened; but there was a continuous feeling of general illness and languor, with relaxation of the soft tissues. There was always abnormal brilliancy of the eyes.

At the end of three weeks she was only just sufficiently well to bear removal for a short distance, for the benefit of purer air; but at this time neither the weakness nor the laryngeal hoarseness was gone. On March 27th it was reported that she was improving, but that for a fortnight past she had been suffering from slight numbness and weakness of both the legs. The voice was weak, but no longer hoarse.

She shortly after was removed to Brighton, and then gradually recovered.

NOTE.—Several members of this lady's household suffered from diphtheria, for which no cause, external to the premises, was apparent. Her residence was situated on the top of a sloping hill, and the drains

were in doubtful order. The cesspool was located at a considerable distance from the house, part of the way down the hill, and the drain tube sloped up to the house, with no ventilation whatever between it and the water closets. It had not been recently emptied.

Case 7.—DIPHTHERIA. Stridulous breathing. Death.

A. B., æt. 2½. First seen on May 31st, 1859. Three days previously the child had suffered from diarrhœa, but did not appear to be seriously ill until the previous afternoon, when it was seized with hoarseness of voice and stridulous breathing. The dyspnœa was worse this morning, and had continually increased up to the present time, viz., 3 p.m. The child was now listless, unable or disinclined to sit up or raise itself in its mother's arms. The breathing noisy and stridulous, accompanied by an occasional loud or expulsive cough, but without the back-drawn inspiration of croup. The skin soft and relaxed, but not feeling hot. The pulse weak and feeble. No tenderness on pressure outside the throat, and no marked swelling here. On examining the fauces, the tonsils were seen to be swelled, and of a dark red colour; the uvula also swelled, as well as the adjacent portion of the soft palate. Attached to the uvula and soft palate, and apparently also to the pharynx, was a mass of ragged white exudation matter. Breath offensive. The stethoscope detected nothing in the larynx but stridulous breathing, the noise of which masked the ordinary sounds of respiration in the lung.

This child died the following morning. The treatment attempted was—an emetic of sulphate of copper; solution of chloride of soda, to the throat; tincture of iron with quinine, to be taken; and a diet of milk with brandy.

Case 8.—DIPHTHERIA. Laryngeal implication. Death. Post-mortem examination.

J. E., æt. 2½. A plump and strong-looking child. First seen in the afternoon of January 16th, 1858, when she was already in a dying state. Her mother stated that, four weeks previously, she had suffered from an abscess in the neck, which had not quite healed, but that otherwise she was in good health. On the preceding afternoon her mother had first noticed her to be ill, and observed her to be restless, much inclined to doze, and apparently very feeble. In the course of the following night she began to cough a little, and to be hoarse, and the respiration became rough and noisy, but not stridulous. When visited, the child was evidently sinking from exhaustion, breathing loudly and roughly, but not croupily. The tonsils were covered in patches with a whitish exudation. A little brandy was given, which the child swallowed readily, and a sinapism was applied to the throat; but she died at 6 p.m., about twenty-three hours after her seizure.

Body examined, twenty hours after death. On looking into the mouth, the tonsils seemed pale, but were much obscured by a quantity of viscid gelatinous mucus, which filled the whole of the back of the throat. It was also noticed that the lips were firmly glued together by this viscid mucus. On removing the parts, the tonsils were found to be pale, slightly ulcerated in spots, with a very thin coating (in patches, and not covering the ulcers) of incipient false membrane. The pharynx was unaffected, as was the upper surface of the epiglottis; but the under surface of the epiglottis, as well as the whole circumference of the larynx down to the lower border of the cricoid

cartilage, was covered with a thin and rather dirty-looking layer of false membrane, which could be readily peeled off from the mucous membrane beneath. Some irregular patches of exudation were also found in the upper part of the trachea.

Microscopically examined, this membrane was found to be composed of epithelial-like scales and granular corpuscles of various sizes, held together by a viscid unorganized material. In a portion taken from the larynx were also found numerous fine threads of what appeared to be vegetable mycelium.

Case 9.—DIPHTHERIA. Tracheotomy. Death.

Master H., æt. 12. Seen with Dr. Guy and Mr. Cadge. Attacked whilst at boarding-school, and one of four boys occupying the same bed-room, all of whom suffered, in various degrees, from this disease. When asked to see him, on February 17th, 1880, he had been suffering for three or four days with a dirty, ulcerating, diphtheric throat. On the morning of this day, the appearance of the fauces had considerably improved, but he had begun to show signs of laryngeal dyspnœa. About ten o'clock in the evening he suddenly became worse, the face became dusky, and almost at once unconsciousness supervened. The pulse was now feeble and slow, and the pupils of the eyes large. It was now decided, after consultation, that tracheotomy was urgently necessary, and accordingly, with as little delay as possible, and without giving chloroform, the upper part of the trachea was opened by Mr. Cadge (very little bleeding taking place), and a tube fitted into

the wound. Air was at once freely sucked in, the countenance improved, and in less than half an hour consciousness returned. Some nourishment was now given, the air of the room was kept at a proper temperature, and the state of the tube and breathing was carefully watched.

On the following day the lad was quiet and conscious, and fairly comfortable. Pulse not quick. Temperature 101° F. There was no appearance of any granulations around the wound. There was a very little cough; and the air entered freely through the tube with a hissing sound, and fairly inflated the lungs; but occasionally an attack of dyspnœa would threaten from a momentary blocking up of the canula.

On the next day, February 17th, there was more dyspnœa, with increased difficulty in keeping the canula clear. He had been very restless, and unable to sleep through the night. The countenance was more dusky, though the lungs were evidently inflated. Pulse weak, but not quick.

He died in the afternoon, apparently from exhaustion as well as dyspnœa.

On examining the body, twenty-four hours after death, it was observed that the throat wound was dry, and presented no signs of commencing repair. The fauces had nearly recovered their normal appearance. The upper part of the windpipe, i.e., the larynx and the portion of the trachea above the wound, was *filled* with a mass of exudation matter, looking like a mixture of pus and dirty slough, with rings of false membrane. Below the surgical opening, the trachea and all larger bronchial tubes were surrounded or filled with rings and tube-casts of false membrane, moderately tough in consistence, but easily detached from the

mucous membrane. The lungs themselves were pale, dry, bloodless, and full of air. There was a remarkable absence of blood in all the parts examined.

In this case it is to be noted that the above lad and all the three others of his schoolfellows who were attacked with diphtheria occupied the same bed-room. In this room, which was long and rather narrow, each boy had a separate bed, the beds being placed in a row between the door and the window. The boy who slept in the bed nearest the door was the first seized with sore throat, and then the others almost in regular series.

No cause could be assigned for the outbreak, and the house was stated to be perfectly wholesome and well drained. After the dispersal of the school, however, the drains were ripped up, and then it was discovered that one of these had given way, and that its contents had for long habitually escaped into the basement of the house. From this spot an open shaft or gangway led up to the bed-room floors. As soon as the soil below was disturbed, the odour from it was very foul and nauseating.

If this contamination was the cause of the disease, the foul air must have risen to the landing, have flowed along it, and then have entered at the door of the room in which the boys slept, affecting first the one who occupied the bed nearest to the doorway.

Case 10.—DIPHTHERIA. Laryngo-tracheal implication. Proposed tracheotomy. Death.

Miss S., æt. 4. (Seen with Mr. Morgan and Mr. Crosse.) Was first visited by me on January 14th, 1869.

She had been taken ill the preceding day, and her symptoms—hoarseness and a slight cough—had been gradually increasing. At this time there was some harsh laryngeal breathing, with an occasional expulsive effort to clear the windpipe.

The throat was slightly red. On the left tonsil was a small elongated patch of white mucus. The skin was notably flabby, rather hot, and with a distinct tendency to perspiration.

On first seeing the child, the idea presented itself that the windpipe was the only part affected with disease; but the flabby muscles, the relaxed and perspiring skin, and a peculiar manner, led to the belief that the disease was rather one of laryngeal diphtheria; a belief soon converted into a certainty when we were informed that an elder brother, who had left home a few days before, was then lying dangerously ill in London with what was there called Diphtheria (and of which he subsequently died).

On the following day, January 15th, the throat was still almost free from diseased appearances, but the difficulty of respiration had markedly increased, though there was no constant lividity of the countenance. There was a marked increase of the flabbiness and relaxation of the skin, and the child began to be restless, and took food or medicine unwillingly. And now the probability of tracheotomy being required began to force itself upon our attention, for twice or three times during this day a paroxysm of coughing came on, which for a few minutes produced a leaden hue of countenance, and rendered the breathing, which was constantly harsh and prolonged, doubly difficult and laboured.

However, these occasional paroxysms soon passed off, and then the signs of lividity greatly improved, and it was evident that though the larynx was much occupied with exudation, and the inspiration consequently was difficult, yet that air entered sufficiently freely to carry on reasonable oxidation of the blood in the lungs; and it seemed, on the whole, that the child's increasing feebleness was due more to its general illness than to the want of aëration of the blood.

The child was closely watched all through this day and evening. In the night a fresh suffocative paroxysm having come on, another consultation was held; but still, though respiration was sufficiently interfered with to cause the inspiratory act to be prolonged and the larynx and trachea to be distinctly sucked in by the effort, yet the failure of general power and nervous tone was so clearly disproportionate to this difficulty, that we all agreed that the making an opening into the windpipe would give only partial relief, and would probably be quite ineffective to save life, especially as the presence of a mucous râle in the lower part of the trachea showed that exudation existed some way further down towards the lungs. It was therefore decided that tracheotomy should only be recommended if suffocation at any time threatened to be imminent.

During the next day (January 16th), however, the impediment within the windpipe appeared gradually to increase still more, and the difficulty of inspiring to become greater. The face became also more continuously dusky. The extraordinary muscles of respiration now also began to be brought into exercise, the trachea was deeply sucked in at each inspiratory effort, and the child became both

restless and exhausted. It had now become evident, therefore, that she must soon die if unrelieved, though she would probably die under any circumstances; and so, with the consent of the parents, it was determined to give the chance offered by tracheotomy.

The question of the administration of chloroform was discussed; the danger of abolishing the action of the extraordinary muscles of respiration was considered; but, on the other hand, it was seen that from the extreme restlessness and excitability, the operation would be impossible without it. The child was placed upon the table. She was very feeble, but she resisted being restrained. The chloroform was very cautiously begun to be administered. Almost immediately, however, it became evident that her small efforts at resistance had exhausted her remaining strength. She became quite passive. The chloroform was at once discontinued, and she died after a few minutes, before any operative proceedings were or could be attempted. Artificial respiration was employed for a time, but—almost of course—in vain.

No *post-mortem* examination was allowed.

Case 11.—Croupy Tracheitis. Death. *Post-mortem* examination.

C. D., æt. 10. First seen by me on April 26th, 1850. She had then been ill for five or six days, with cough and other symptoms of bronchitis, which was then prevalent amongst the children of the neighbourhood. Two days before this, she had begun to breathe noisily and with

difficulty, and to talk hoarsely. At the time of my visit she was labouring for breath, inspiring noisily, as if through thick mucus, but scarcely with stridor, and complaining of uneasiness of the middle of the windpipe on the right side. She coughed at intervals, and then expectorated some opaque mucus. Throat unaffected. Pulse quick and feeble. Four leeches were now applied to the throat, and small doses of antimonial wine were given at intervals until vomiting was induced.

The leeches bled freely, and the coughing was (six hours later) apparently relieved; but the breathing had now become difficult and stridulous. A small blister was applied to the outside of the throat, but the child's respiration gradually became worse, and she died at ten o'clock the next morning.

Necropsy. Body fat, and the parts over the windpipe especially so. The coverings of this tube much congested. On compressing the trachea, opaque purulent fluid welled up into the pharynx. On slitting up the larynx and trachea, the tube was found to be nearly full of soft lymph, which partly adhered to its walls, but also tended to fill up the central cavity. The adhesion was slight in the larynx, but more marked in the trachea. The muco-purulent exudation extended down into the larger bronchi on both sides. On the concavity of the thyroid cartilage was a small ash-coloured spot of mucous membrane, about one-third of an inch square, which adhered firmly in one part to the cartilage. On removing the exudation-mucus, the whole of the interior of the windpipe, from the epiglottis to the lower part of the trachea, was seen to be very red and congested. The lungs were congested, but otherwise healthy.

This case, which occurred in 1850, may well be compared with others which occurred at the later periods. The similarity of the post-mortem appearances may be noted, as well as the form of treatment then adopted for "croup."

Case 11*a*.—DIPHTHERIA. Asthenia, croup, death, Probable infection from sewer.

Miss L., æt. 5. Seen May, 1882, with Mr. Rodwell. Had then been ill six days, and was getting feeble and exhausted, and listless. The breathing was very tracheal, but operative interference was not thought to be available.

There was scarcely any soreness of throat, though the tonsils were hypertrophied; and the child swallowed without difficulty. There were some scattered râles in the lungs. The skin was perspiring freely.

Death took place the following day.*

Case 12.—DIPHTHERIA. Formation of false membrane on wound of arm. Recovery.

Miss R., æt. 50. Seen in August, 1874. Had had a small tumour removed by Mr. Muriel from the outside of

* At this time no diphtheria was known to prevail in the district; and no source of external contagion was apparent. The child's father and a servant had both had slight sore throats.

On carefully examining the premises it was found that the rain-water pipe leading from the roof down into the drain was defective near the nursery window, and sewage air might thus have passed into the child's room.

her right upper arm, about a week before this date. The wound was beginning to heal, when a sudden outbreak of diphtheria occurred in the house in which she was staying, two children being struck down severely with this disease. Immediately the wound ceased to progress, and a day or two afterwards it became covered with a distinct membranous pellicle. The patient suffered slightly, also, from sore throat, and passed through the usual stages of adynamic fever, having afterwards a long and tedious convalescence. Local applications to the arm gradually removed the false membrane, and by and bye healthy granulations again appeared, and the sore healed. But the local repair was remarkably slow, and cicatrization was long deferred. She eventually completely recovered.

Case 13.—DIPHTHERIA. Secondary abscesses. Death.

Miss S., æt. 25. Seen November 19th, 1864. This lady died this morning, after an illness of five weeks' duration. She was first seized with sore throat, accompanied with an abundance of membranous diphtheritic exudation, and swelling of the glands externally. In three or four days the throat had greatly improved, and the glandular enlargement had been gradually subsiding. The pulse, however, had remained quick, and she had suffered from almost daily rigors. A few days later, an abscess had formed over and above the right clavicle. This was in due time opened and had discharged at first offensive pus, but the matter had gradually become purer and the abscess had healed. The quickness of pulse had, however, remained. The

breathing had now become short, and at times dyspnœal. For some time no morbid auscultatory signs could be discovered, but latterly, moist, almost catarrhal, sounds were heard in both lungs, but most abundantly at the base of the right, with metallic tinkling. There was neither cough nor expectoration. After this, she suffered from stiffness and tenderness in the right hip. Still later, the attacks of dyspnœa gradually became more frequent and severe, and she died (evidently of the secondary results of poisoned blood).

No exact cause for her illness could be made out; but she was in the habit of attending an evening school, from which two or three teachers had gone away ill with sore throat.

The treatment was tonic and supporting throughout.

Case 14.—DIPHTHERIA. Paralysis of limbs. Recovery.

Mr. E., æt. 40, a farmer. Was sent to me by Mr. Hales on May 18th, 1878, on account of weakness and numbness of the ends of the four extremities, from which he had been suffering for several weeks. I was informed that in February he had suffered from an attack of diphtheria, from which he had recovered in due course, but that about six weeks afterwards his limbs had begun to feel numb, and that his muscular power in them had since considerably diminished. This numbness and weakness extended in the upper extremities as high as the wrists, and in the lower about half-way up the legs. He had at first had difficulty in swallowing, but at this time he had no other paralysis

than that of the limbs. He said that he was weak and nervous, and often and easily became faint. There was no dropsy, and no albuminuria. This condition had remained almost stationary for several weeks, and though he had taken tonics and cod liver oil, he had very slightly improved.

No distinct cause for his throat illness was known, but it was believed that neither the drainage nor the water supply on his premises was very good or wholesome.

He was now advised to go to the seaside, and to continue a mineral acid tonic, and he slowly improved and eventually quite recovered.

Case 15.—DIPHTHERIA. Secondary paralysis. Recovery.

Mr. S., æt. 30, by profession an organist, consulted me on March 16th, 1874. He stated that five months previously he had suffered from diphtheria; that, soon after recovery from the sore throat, he had had difficulty of swallowing, and weakness of the eyes; and that about seven or eight weeks after his seizure he began to suffer from defective and altered sensation in the hands and feet, and of the portions of the respective extremities immediately above these. He said that all the various weaknesses were greatly better, and appeared to be gradually improving, but that the hands and feet still remained weak and numb.

He had been taking mineral acid and quassia, and as he appeared to be doing well under it, he was advised to continue it. He was also recommended to go to the seaside.

He gradually convalesced.

Case 16.—DIPHTHERIA. Paralysis of Œsophagus. Death.

Mr. H., æt. 28. A farmer. First seen (with Mr. Button, of Diss) on March 14th, 1873. At this time he had been ill with a diphtheric sore throat for about a week. He believed that the disease was caught from a maid-servant in the house, whose breath he had directly inhaled. His case had been apparently progressing favourably until two days previously, when he had begun to have some difficulty in swallowing, both food and fluids returning by the nose when he made the attempt. On examination, his general appearance was good. The pulse was quiet. The temperature, 97·4. The throat was moderately red. The uvula long and red. The tonsils somewhat deeply ulcerated. A yellowish mucous exudation was present at points of the fauces, but no true membranous layer. On attempting to swallow, the food and liquid was immediately returned through the nose. The urine was highly albuminous, but in good quantity. Except for the difficulty of swallowing, he stated that he felt almost well. He had been fed for two days by beef-tea enemata.

It was now decided on consultation that he should be fed at intervals through a tube (with a funnel) inserted a sufficient distance into the œsophagus.

On March 22nd he died. The œsophagal tube was passed once, and some liquid food introduced into the stomach, but it caused so much pain and such intense distress that he would not have it repeated. Enemata of beef tea, with brandy, were therefore resumed. But in spite of all care, he sank apparently from exhaustion, having never recovered the slightest power of swallowing.

Case 17.—DIPHTHERIA. Secondary paralysis. Death.

W. P., æt. 45. Single. A farmer, stout, dark, and robust. Seen on December 27th, 1863. Five weeks prior to this time he was attacked with diphtheria. The throat had recovered, but a few days before this date he had begun to suffer from partial paralysis of both the legs, and of the hands and forearms. The palate and œsophagus were also affected, and he swallowed with difficulty. Four days previously he had expectorated some blood, and yesterday he had two fainting fits, which had caused much alarm. The paralytic symptoms had continued to this time, and he now also complained of a dry, choking cough. He appeared to attribute the paralysis to a draught upon his neck.

On examination, there was found to be diminished sensation in all the parts mentioned, as well as in the skin of the abdomen. The muscular power was also diminished in the limbs, and his power of standing and walking, feeble. There was distinct tenderness on pressure upon the dorsal spine. He was only able to swallow food with difficulty, but managed to take freely of liquids, as well as wine. The pulse was quiet.

He was ordered a dose of sulphate of iron two grains, of sulphate of zinc and quinine, of each one grain, with a small quantity of strychnine, to be taken three times in twenty-four hours.

On January 3, I learned that he had died on the preceding day, the paralysis having gradually increased, the power of swallowing having been almost entirely lost, and death having been preceded by two fits of orthopnœa.

Case 18.—DIPHTHERIA. Secondary paralysis of all the limbs. Recovery.

H. G., æt. 27, a labouring man. Four months previously to June 4th, 1859, had suffered from a sore throat, which he was told was diphtheria. Several of his neighbours had also suffered from sore throat at the same time. He was ill for several weeks. At the end of about ten weeks from the date of his seizure, he began to feel numbness and tingling in all his limbs; the lower extremities being affected from the toes as high as the knees, and the hands and arms as high as the elbows. There was also considerable loss of muscular power. The morbid sensations continued to increase for about a month from their first onset, but for the last fortnight they had been about stationary. The tongue was clean, the bowels open, the pulse quiet, but soft and languid. The complexion not pale. He was ordered to take one grain each of sulphate of zinc and sulphate of quinine, with ten grains of citrate of iron, thrice daily.

On June 15th there was decidedly less numbness, and rather more muscular power, the recovery being markedly greater on the left side.

On June 22nd he was very much better. The muscular power in both the hands and legs was greatly increased, but the legs always felt very weak towards evening. The numbness—which had always been most marked in the soles of the feet and the palms of the hands—had continued to diminish. The urine, examined, was found to be of specific gravity 1010, and to yield a scanty precipitate, containing pale uric acid, a few crystals of oxalate of lime, and a little squamous epithelium.

By July 13th the numbness of the hands had quite disappeared, but it still remained in the bottoms of his feet, as well as an occasional tingling sensation after exercise. He could now walk easily a considerable distance. The power of grasping with the hands was almost normal again.

On August 3rd he reported that he felt quite well, and that the last traces both of muscular weakness and of the cutaneous abnormal sensations had disappeared. He had continued to take the same medicine up to this time.

The duration of the whole case was thus six months, and of the diphtheric paralysis about ten weeks.

Case 19.—DIPHTHERIA. Paralysis of limbs. Recovery.

James G., æt. 17, husbandman. Admitted a patient of the Norfolk and Norwich Hospital, November 27th, 1858. He stated that about ten weeks previously, and soon after being discharged from the county prison, he was attacked with diphtheric sore throat, which was then prevailing in the district in which he lived. On recovering from this, at the end of about a month, he began to complain of numbness and of weakness or partial loss of power in the arms and legs, and to a slight degree in the whole trunk. For these symptoms he had been under medical treatment at home, but without benefit up to this time.

On admission he was found to be well formed and robust, but pale and weak. His chief complaint was of debility, and of want of muscular power in all the limbs. His power of grasping with the hands was very slight, but rather greater in the right than the left hand. He waddled in his walk, but did not drag either leg. The reflex actions

were almost absent on both sides. Sensibility was very slight in either of the lower limbs, as well as in the hands and arms. The skin of the whole trunk was also slightly numb. The pupils were dilated. The pulse soft and weak. A soft systolic murmur was heard over the base of the heart. The urine was pale, clear, of specific gravity 1009, and free from albumen or special microscopic deposit. The throat appeared to be quite well, the bowels were regular, the tongue was clean and protruded straight, and the appetite was moderately good. He was free from pain in the head or elsewhere, and had not had any kind of convulsive seizure.

He was ordered good diet, with a pint of porter; and to take thrice daily a draught containing the sulphates of iron, zinc, and quinine, with a little dilute sulphuric acid.

On *Dec.* 10, the note states, he is slightly better. He can walk more steadily, and has rather more power of grasping with the hands, but the numbness is not much diminished. He is still very pale and anæmic-looking. Ordered to take ten grains of citrate of iron, with two grains of sulphate of zinc, and one grain of sulphate of quinine, thrice daily.

Dec. 14. Is rapidly improving. Can walk better and grasp more strongly. Sensibility is returning in both the arms and legs. Appetite is very good. Urine less pale, slightly acid, of specific gravity 1018.

Dec. 27. Steadily improving. Looks better, and feels much stronger. Power of grasping with the hands much greater. Reflex actions as well as sensibility in the legs returning. Ordered to continue his medicine.

Jan. 4. Going on well; some slight numbness of both the hands and feet still remains.

Jan. 29. Complains only of a very slight numbness of the right foot; in other respects he is quite well.

Discharged cured.

Case 20.—DIPHTHERIA. Secondary paralysis. Recovery.

W. N., æt. 17. Occupation a groom. Admitted a patient of the Norfolk and Norwich Hospital, April 2nd, 1859. He stated that he was seized at the previous Christmas with sore throat, which he was told was diphtheria; that he recovered from this in about three weeks, and returned to his work; but that after a fortnight he was obliged to give it up again, by reason of weakness of his limbs.

His legs, he said, were first affected, becoming gradually numb and incompetent to any exertion without great and rapidly supervening fatigue. At this time he had a little pain at the back of the neck, but in no other part. In about a fortnight after the legs became affected, the hands also began to feel numb and weak, so that soon he could scarcely feel anything he touched, and was unable to hold even a cup without using both hands. Now also the face (cheeks and nose) began to feel numb.

In addition to this he had felt very weak, but had always had a good appetite, and had not suffered from dyspepsia, lowness of spirits, want of sleep, or irregularity of bowels or bladder. He had never suffered from any other severe illness.

He had been under medical treatment, but the numbness and muscular weakness had continued to increase up to the present time.

He added that three of his brothers and sisters had suffered from sore throat before he was attacked, and that one, a brother aged twenty-three, had afterwards had for about a week some slight numbness of both legs and hands, but that he had then recovered.

His present condition is this—countenance fresh and cheerful-looking; pupils not dilated; tongue protruded straight. He complains of numbness of the whole of both the lower extremities, and of the arms as high as the middle of the forearms; there is also, although in a lesser degree, some numbness of both cheeks and of the nose.

The power of grasping with the hands is much diminished; the loss of voluntary power being equal on the two sides. He straddles in his walk, moves slowly, and is evidently unable to guide his legs properly. Reflex actions are lively when the soles are pricked with a sharp instrument, but he has scarcely any perception of the impression made upon any part of the skin of either the feet or legs by a broad surface.

The trunk appears to be unaffected. He says he is quite free from pain, and but for this weakness of the limbs would feel quite well. Pulse soft and weak, 88.

Heart's sounds sharp and clear; a moderately rough systolic bruit is audible over the base of the heart. The throat is slightly relaxed, but not sore. Appetite good. Bowels regular. Urine passed freely, sherry-coloured, of specific gravity, 1025, acid, and free from albumen.

Ordered to take one grain of sulphate of zinc thrice daily, in some water, with full diet and beer.

April 8. Rather better. Has more power of grasping with the hands, and walks rather stronger. Numbness

much the same. To take two grains of sulphate of zinc daily.

April 19. Says he has rather more feeling in his hands, and rather more power over the muscles, both of the arms and legs; but sensation in the feet is not much greater than on admission. To take two grains of sulphate of zinc, and one grain of sulphate of quinine, thrice daily, with ten grains of citrate of iron.

May 13. Has been steadily and rapidly improving since the change of medicine. He can walk well, has little or no numbness, and complains of nothing but a slight feeling of weakness in one ankle. There is no longer any murmur to be heard over the heart.

May 20. Quite well, in all respects.

Discharged cured.

Case 21.—DIPHTHERIA. Secondary paralysis. Recovery.

Henry G., æt. 27. Farm labourer. Admitted an out-patient of the Norwich Hospital, June 4, 1859.

States that four months ago he suffered from sore throat, which he was told was diphtheria, and for which he took medicine and had caustic applied locally. Several other persons, his neighbours, were similarly affected at the same time. In about ten weeks, and just as he began to consider himself well and able to go to work, he began to feel a weakness, with numbness and tingling, in both his fingers and his feet. This continued to get worse, gradually extending as high as the knees and elbows, for about a month; since which time it has been stationary,

and it is now his only complaint. In other respects he is quite well. Has a good complexion, is well nourished, has a good appetite, and bowels are open daily. Pulse soft and weak.

Has not suffered from any privation. Has taken no medicine for his present symptoms.

Ordered steel, zinc, and quinine, with good diet and porter.

July 7. Reports himself as nearly well. He has continued to take the same medicines, and has been gradually improving ever since his admission; the return of power in the upper limbs having all along been in advance of that in the lower extremities.

Case 22.—DIPHTHERIA. Secondary paralysis. Recovery.

James R., æt. 63. Husbandman. Admitted a patient of the Norfolk and Norwich Hospital, June 12, 1858. States that he is a married man, of temperate and regular habits, always having enjoyed excellent health until January last, when he was laid up for a month with influenza. From this he speedily recovered, and resumed his usual employment, and remained quite well until two months ago, when he caught what he considered a bad cold. For this he took medicine, but was not compelled by it to discontinue work, and in about a fortnight he got well again. He was then seized with a numbness in his hands and feet, preceded for two or three days, but not accompanied by, vague pains in the back and elsewhere (which he attributed to extreme constipation of the bowels). Since

that time the numbness has increased in both the arms and legs, and there has been also considerable and increasing loss of muscular power in all the limbs. He has been under medical treatment, has been bled (to a pint), and appears also to have taken mercury, and then to have been galvanized, without any impression having been made upon his disease. He knows of no special cause for the attack. Has not suffered from gout or rheumatism, nor been exposed to the action of lead. Has neither been overworked nor strained.

Present state. Complains of loss of feeling and strength in the forearms and hands, and in the feet and legs as high as the middle of the calf. At times he has slight 'snatchings' of both legs and arms. The reflex actions are nearly absent. Gait stiff and trembling. Has very little power of grasping with either hand. Slight numbness around mouth. Is drowsy. Taste slightly diminished. Tongue protruded a little to the right side. Intellect unaffected. No pain of head or elsewhere. Heart's sounds weak, but free from murmur. Left radial artery beats more strongly than the right. Pulse 60, soft and full. Bowels extremely costive and acted upon with difficulty. Sphincters unaffected. Appetite good. Sleeps well. Has a good colour in his face, and looks well nourished. Urine free from albumen and otherwise normal. Ordered to take one drachm of solution of bichloride of mercury in an ounce of decoction of cinchona, three times a day; and a pill of colocynth and croton oil, every night, if required.

June 18. Much the same. To have full diet.

June 28. There is very little alteration since his admission. The numbness and weakness of limbs and

absence of reflex action remain much the same. Pulse still very weak. Ordered a mixture of sulphates of quinine, zinc, and magnesia, with a little dilute sulphuric acid.

July 2. Decidedly better. Pulse is firmer, 72. He is no longer drowsy, and has regained a little muscular power in the hands.

July 6. Walks better, and has more power of grasping with the hands. Numbness of left hand and arm diminished, and quite gone from the face. Pulse has again fallen to 60, and is very weak. Bowels very obstinate. To have a pint of porter daily.

July 13. Much better. Pulse fuller and stronger. Numbness and weakness fast disappearing.

July 23. Numbness all gone, except from the tips of the fingers and toes, and he is rapidly improving in all other respects. Bowels still costive.

To be made an out-patient, and ordered to continue his medicines.

August 18. Reports himself quite well, except that rarely he has a little numbness at the end of his toes. Looks fat and florid and well. Bowels now act regularly without medicine.

Discharged cured.

Case 23.—Diphtheroid Sore Throat. Recovery.

E. B., æt. 35, married. On *April* 8, 1862, had been ill five days with sore throat, which had come on some three weeks after her confinement. Up to that time her convalescence had been perfectly satisfactory. Since her seizure she had suffered from soreness and pricking of the throat,

from difficulty in swallowing, from fulness of the right tonsil, and from tenderness and swelling below the angle of the jaw externally. Since yesterday, in addition to the redness and swelling of the fauces, tonsils, uvula, and soft palate, a number of small whitish or yellowish points of exudation had appeared upon the right tonsil.

No cause could be assigned for the attack absolutely, unless it were that the offensive smell from a neighbouring stable yard entered her bedroom whenever her window was opened. Her nurse had suffered from sore throat in a slighter degree.

When first seen, she was pale, though flushed; skin was hot, relaxed, and perspiring; pulse 100 and soft. The bowels well open, and the urine passed freely. The throat was swelled, and tender externally, chiefly on the right side. Internally, the whole of the soft palate, uvula, tonsils, and pharynx were seen to be very red and œdematous, the uvula especially being very long and swollen. On the right tonsil was seen a cluster of small dirty white points of exudation, but no distinct pellicle. The voice was husky, but not laryngeal. Swallowing was painful, and fluids often returned partially through the nostrils. The breasts were full of milk, and she was still suckling her baby. She was ordered a mixture of tincture of iron, with quinine, and chlorate of potash, and to take some wine.

Next morning the general symptoms and the appearance of the throat were much the same, and the skin was still relaxed and perspiring. The urine was ascertained to be free from albumen.

Ordered to use frequently a gargle of solution of chloride of soda.

In the evening, with the same general symptoms, a small slough showed itself between the uvula and right tonsil. The throat was now mopped out with tincture of iron, and hot poultices applied externally, and the quantity of wine was ordered to be increased.

Next day, *April* 10th, another slough had formed low down behind the right tonsil. Pulse 92. Tongue clean. Skin very relaxed.

On *April* 11 the throat was again more swelled, and the uvula more œdematous. The sloughs on the palate and tonsil remained.

On *April* 12th the throat was very red and inflamed, and on the right side was a distinct yellow membranous pellicle. On the uvula were visible two or three spots of viscid mucus. The glands of the neck were rather more swollen. Ordered to inhale freely the steam of a hot decoction of poppy heads, and to increase the dose of chlorate of potash to ten grains.

Two days later, the condition of the throat had scarcely changed, and the exudation patches remained. (The infant continued quite well, although it had been allowed to suck a little milk occasionally.) She had latterly been taking nearly a bottle of port wine daily. For the last few hours she had been almost suffering from salivation (? from the chlorate of potash). The medicine was now omitted, and simply a dose of ʒss. of tincture of iron substituted for it.

From this time she began decidedly to improve. The throat gradually became less red and swelled, though the pellicle did not separate until two or three days later; and the skin lost its relaxed and sodden condition. She

was considered convalescent, about the 28th April, although there was still some fulness and redness of the throat remaining. During this latter fortnight she had on one or two occasions taken as much as two bottles of port wine in twenty-four hours, with apparently distinct advantage.

Case 24.—DIPHTHEROID. Membranous exudation on gums. Hœmorrhage from mouth and nose. Recovery.

E. P., a shoemaker's daughter, aged two and a half years, became a patient of the Norwich Dispensary, August 20, 1859.

She had no marked soreness of the throat, and no exudation on the fauces, but the gums around the front teeth in the lower jaw were covered with a rough and whitish membranous exudation, covering an imperfect ulceration beneath. There had been several small bleedings from the nose and mouth, and the breath was offensive. She was treated with tincture of iron and quinine internally, and a lotion of sulphate of copper to the gums. The lotion caused the shedding of the gum pellicle, but it returned several times, and also appeared upon the gums around the incisors of the upper jaw. Eventually it ceased to recur, and the child recovered.

Case 25.—DIPHTHEROID SEIZURE. Sewer poisoning. Recovery.

J. P., æt. 50, a groom. Visited by me in consultation with Mr. Bailey on *November* 8, 1877. He had then been

ill eleven days. His history was that on the day of his seizure, the weather being very wet, he had sat for three or four hours in a harness house and stable, in which was a drain opening. He did not notice that there was any particular smell from it on this occasion, but it had often been offensive previously in wet weather. On the evening of this day he was shivered. He then became feverish, and soon after began to suffer from pain in the belly. Two days later he also suffered from pain in the chest, and a day or two later still his mouth and throat had become sore.

On *November* 8, he was still very seriously ill. The lips were dry and cracked; the whole cavity of the mouth, including the tongue, uvula, fauces, and tonsils, was spread over with a thick, dirty-white coating to its mucous membrane. This was in some places a "fur"; in others, almost creamy in consistence; and in others, almost a pellicle; whilst in spots, red, irritable patches of mucous membrane appeared, where this pellicle had peeled off. The nose and larynx appeared to be unaffected, but he had some difficulty in swallowing. He was occasionally sick. The pulse was 90. The temperature did not exceed 98°. He was reported to have been delirious in the night, but was quite calm and collected by day.

The treatment adopted was the free use of carbolic lotion and gargle to the mouth and throat, and as much nutriment as could be taken. He slowly improved after this date, but it was several weeks before he was really convalescent.

APPENDIX.

In looking over the quarterly reports of the Registrar-General for seven years of what may be termed the first part of the diphtheria outbreak, namely, from 1856 to 1863, it is impossible not to be struck with the enormous prevalence of scarlatina almost throughout England at and preceding this period. The scarlatinal affection does not appear to have been (in any way) confounded with that of the throat disease, and, when diphtheria first appeared, the two disorders appear to have been duly reported as distinct diseases by the local registrars. Still, the fact that the two epidemics of disease, both largely or chiefly involving the throat, so closely followed or accompanied each other, is worthy of a passing notice.

The first Norfolk note which I can find as giving any indication of the coming disease-storm is one for the quarter ending *June* 30*th*, 1856, in which the local registrar says:—

"Five deaths from croup have occurred in the parish of Tasburgh; the ages of the children who died of it were from two to seven years."

In the following quarter, ending September, 1856, the same registrar reports:—

"Diseases of the throat and respiratory organs have been remarkably prevalent among children during the quarter. Of the total number of deaths (84), ten resulted from bronchitis, laryngitis, and cynanche maligna. At Hempnall, four children in one family died of one or other of these diseases in the course of three weeks."

After this, although malignant sore throat was reported in September, 1857, from Essex, no further mention was made of it in Norfolk until the last quarter of this year, when "putrid sore throat" is said to have caused one death in the parish of Stokesby, and "croup" is stated to have been very prevalent in Mancroft District, Norwich.

The first special allusion by the *Registrar-General* to the prevalence of malignant sore throat in England appears to have been made in his summary of the state of the public health for the quarter ending September, 1857, in which he calls attention to its existence in the Eastern Counties and in the south-western division of the kingdom. In the first quarter of 1858 he notices it more fully and carefully, and thus alludes to it:—

"A disease, which is not new, but has been described afresh in France, has been fatal in several districts. It has been called 'throat disease' in some of the returns, and from its having attacked English visitors in Boulogne, the name of that town has been occasionally employed to qualify the affection. Diphtheria, its name in the statistical nosology, is adopted from the French writers who described the disease under the name of diphtherite, in reference to the characteristic membranous exudation in the throat."

After this period, the disease appears to have spread more widely and generally through this country.

In the *first quarter of* 1858 it is reported by the local registrars from Ludham and Bacton.

In the *second quarter* from Stalham.

In the *third quarter* from Smallburgh, Bacton, Swafield, and Buxton.

In the *fourth quarter* from North Walsham, Cromer, Aylsham, Buxton, South Walsham, Loddon, and Stratton.

In 1859 it is reported—

In the *first quarter*, from Stalham, Cromer, Buxton, and Aldeby.

In the *second quarter* from Ludham, Cromer, Sprowston, Stratton, and Mattishall.

In the *third quarter* from Great Yarmouth, Ludham, Stalham, Cromer, Aylsham, and Buxton.

In the *fourth quarter* from Stalham, Cromer, Buxton, Mattishall, North Tuddenham, and Hillington.

In 1860 diphtheria is reported from the registration districts of Stalham, Fincham, Holt, South Walsham, and Wells, and from Henstead Union.

In 1861 it is reported from East Flegg, Castle Rising, Norwich, Holt, Loddon, Diss, Docking, Snettisham, and Litcham districts.

In 1862 it is reported from Holt, Forncett, Watton, Wells, Snettisham, South Walsham, and Diss districts.

And in 1863 from Diss, Middleton, Eynsford, Harleston, Stratton, and Fakenham districts.

At later periods, as is well known, this disease invaded, in varying extent and intensity, almost every part and parish of this county.

Within the last few years it has not appeared in an epidemic form, but scattered cases have continued to recur; and occasionally an isolated outbreak has occurred in some locality.

In the past year (1882) twenty-five deaths have been due to this cause in the county of Norfolk.

I append a note of the annual mortality from diphtheria in *Norwich* for the ten years, 1872 to 1881, extracted from the recent annual summary of the Registrar-General :—

In 1872	—	3	deaths.
1873	—	2	,,
1874	—	8	,,
1875	—	3	,,
1876	—	9	,,
1877	—	7	,,
1878	—	11	,,
1879	—	9	,,
1880	—	3	,,
1881	—	2	,,

Or an annual average rate of mortality from this disease for the ten years of 0·07. In 1881 the rate of mortality from this cause was only 0·03.

JARROLD AND SONS, PRINTERS, NORWICH.